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89080

Site:	MARCO
ID #:	KSD054091545
Break:	10.9
Other:	WPL
	3-31-98

**WORK PLAN
FOR PHASE II OF THE COMPREHENSIVE
INVESTIGATION OF CONTAMINANT
MIGRATION OFF-SITE OF THE MARCO
SITE CHANUTE, KANSAS**

Prepared for:

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S00089204
SUPERFUND RECORDS

March 31, 1998

973-2300.3



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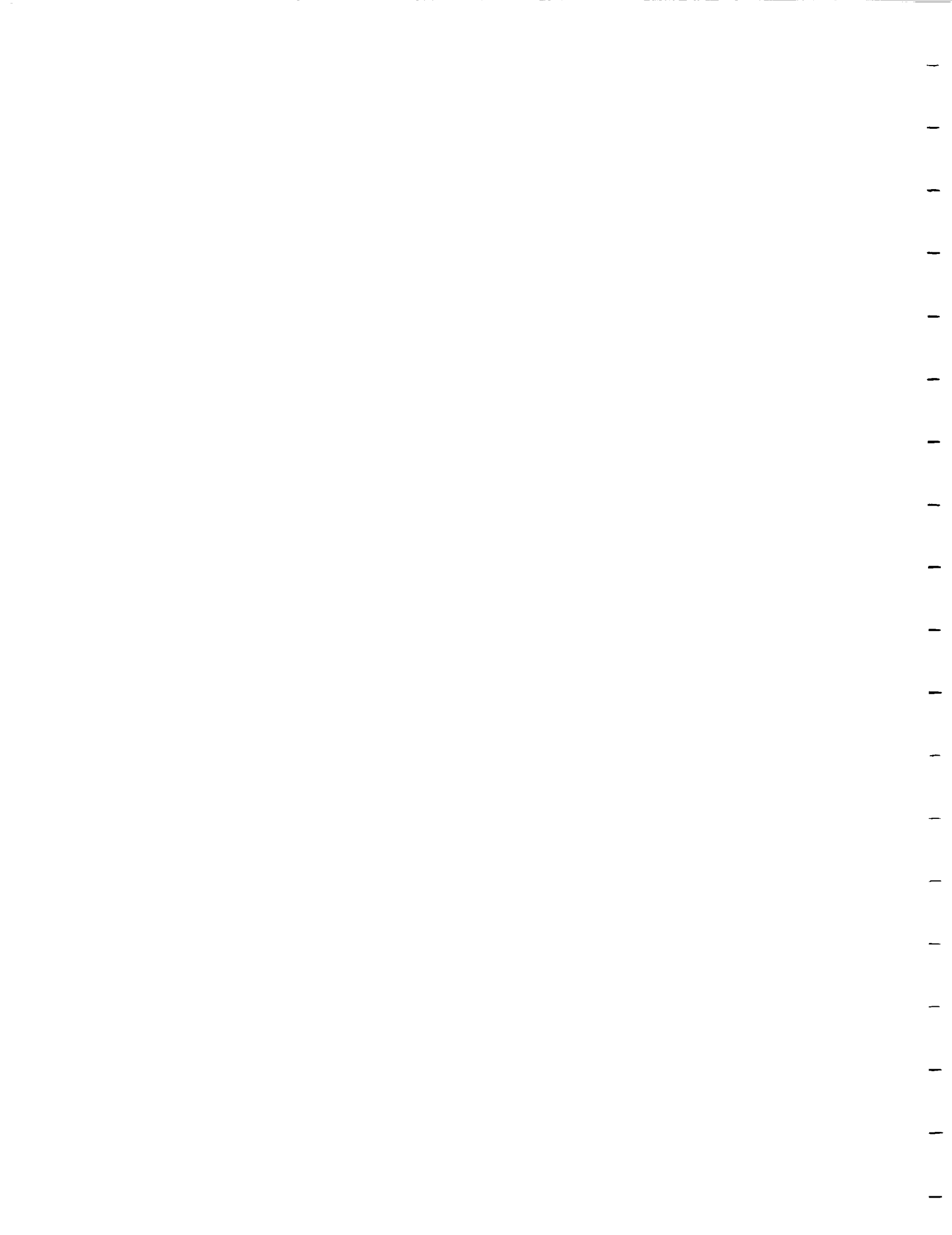
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1.0 INTRODUCTION

In a letter dated March 13, 1998, the Kansas Department of Health and Environment (KDHE) requested that Golder Associates Inc. (Golder) prepare a Work Plan and cost estimate for conducting Phase II of a Comprehensive Investigation (CI) of off-site soil and groundwater contamination near the Mid America Refining Company (MARCO) site in Chanute, Kansas. The draft version of the Work Plan was issued on March 24, 1998. The MARCO site is a former petroleum refinery with suspected off-site migration of contaminants consisting primarily of BTEX (benzene, toluene, ethylbenzene, and xylene) and related petroleum compounds. This CI is being performed by Golder on behalf of KDHE under the State Water Plan and Contract No. 31060.

Phase I activities were conducted by Golder in December 1997 in accordance with the *Work Plan for Comprehensive Investigation Off-Site of the MARCO Site, Chanute, Kansas* (Golder 1997). Phase I investigative locations are shown on Figure 1. These Phase I investigative field activities conformed to the Quality Assurance Project Plan (QAPP) and the Health and Safety Plan (HASP) presented in the Work Plan. Results of the initial investigation were presented to KDHE in the January 23, 1998 *Draft Report on Phase I Investigation of Contaminant Migration Off-Site of the MARCO Site, Chanute, Kansas* (Golder 1998). This report is currently being finalized.

This Work Plan is intended as a concise description of investigative activities and procedures to be implemented for Phase II of the MARCO CI. To avoid redundancy in Golder's submittals to KDHE, the reader is referred to the Phase I documents noted above for more detailed descriptions of pertinent historical information, hydrogeologic conditions, and the extent of soil and groundwater contamination in the site-vicinity. In addition, the reader is referred to the Golder Technical Procedures and the Pace Analytical Services Quality Assurance Plan previously submitted to KDHE.

1.1 Project Objectives

As noted in previous MARCO CI documents, the U.S. EPA is responsible for remediation of contamination within the boundaries of the MARCO property. Since the primary purpose of Golder's study is to investigate contamination that migrated off-site from the MARCO facility, the CI described herein is to primarily focus on the following objectives.

- ▶ Investigate the nature and fully delineate the extent of soil and groundwater contamination off-site of the MARCO property.
- ▶ Identify any human and/or environmental targets in the area and identify all domestic water well users located in the impacted area.
- ▶ Establish the groundwater flow direction in the study area.

1.2 Investigative Scope

The standard KDHE Scope of Work (SOW) for a CI was issued by KDHE for the MARCO project. As a result of discussions with KDHE, it is understood that the MARCO investigation will not include standard SOW components 1 and 5; Component 1 (Historical Evaluation and Site Description) was completed previously, and component 5 (Risk Assessment) is not necessary at this time. Based on the SOW issued by KDHE and subsequent discussions with KDHE, Golder will focus on investigative components 2, 3, 4, and 6, as summarized below.

2. Study Area Investigation - A description of the physical characteristics of the study area, including but not limited to geology, soils, hydrogeology, surface water hydrology, land use, and meteorology. In accordance with the objectives described in Section 1.1, hydrogeologic characteristics will be emphasized.

3. Source Characterization - A description of the field activities used to determine and describe the source(s) and release characteristics.

4. *Nature and Extent Characterization* - A study to determine the horizontal and vertical extent of contamination in soil, groundwater, and surface water, and evaluation of transport pathways.

6. *Identification of Corrective Action Alternatives* - Based on data from the CI, develop an initial list of corrective action alternatives that will be evaluated during the Corrective Action Study (CAS). This list is included in the Phase I report (Golder 1998)

As described in Section 2, the SOW for the MARCO CI also includes preparation of: 1) necessary planning documents; 2) a schedule for completing all activities defined in the SOW; and 3) a CI report detailing the work completed to accomplish the project objectives.

In accordance with the phased approach to the project, the Phase I report (Golder 1998) included recommendations for Phase II activities. In a letter dated March 13, 1998, KDHE agreed with Golder's recommendations concerning the following.

- ▶ Well installation in the uppermost aquifer (Recommendation 1)
- ▶ Well installation in the deeper bedrock (Recommendation 2)
- ▶ Groundwater monitoring (Recommendation 5)

Based on uncertainty concerning remediation activities that will ultimately be implemented in the site-vicinity, the March 13 letter noted that Golder is to defer hydraulic testing until a later stage of the investigation. Evaluation of corrective action alternatives for the uppermost aquifer will ultimately require reasonably accurate estimation of the hydraulic properties of this groundwater flow zone. To fill this data gap, pumping tests will likely need to be performed at some future date to: 1) allow determination of the rate of migration of the contaminant plume located near the southeast corner of the MARCO site; 2) allow evaluation of the hydraulic interconnection between the uppermost aquifer, the deeper bedrock flow zone, and the surficial sand unit that is present in this portion of the site; and 3) support potential remedial design activities.

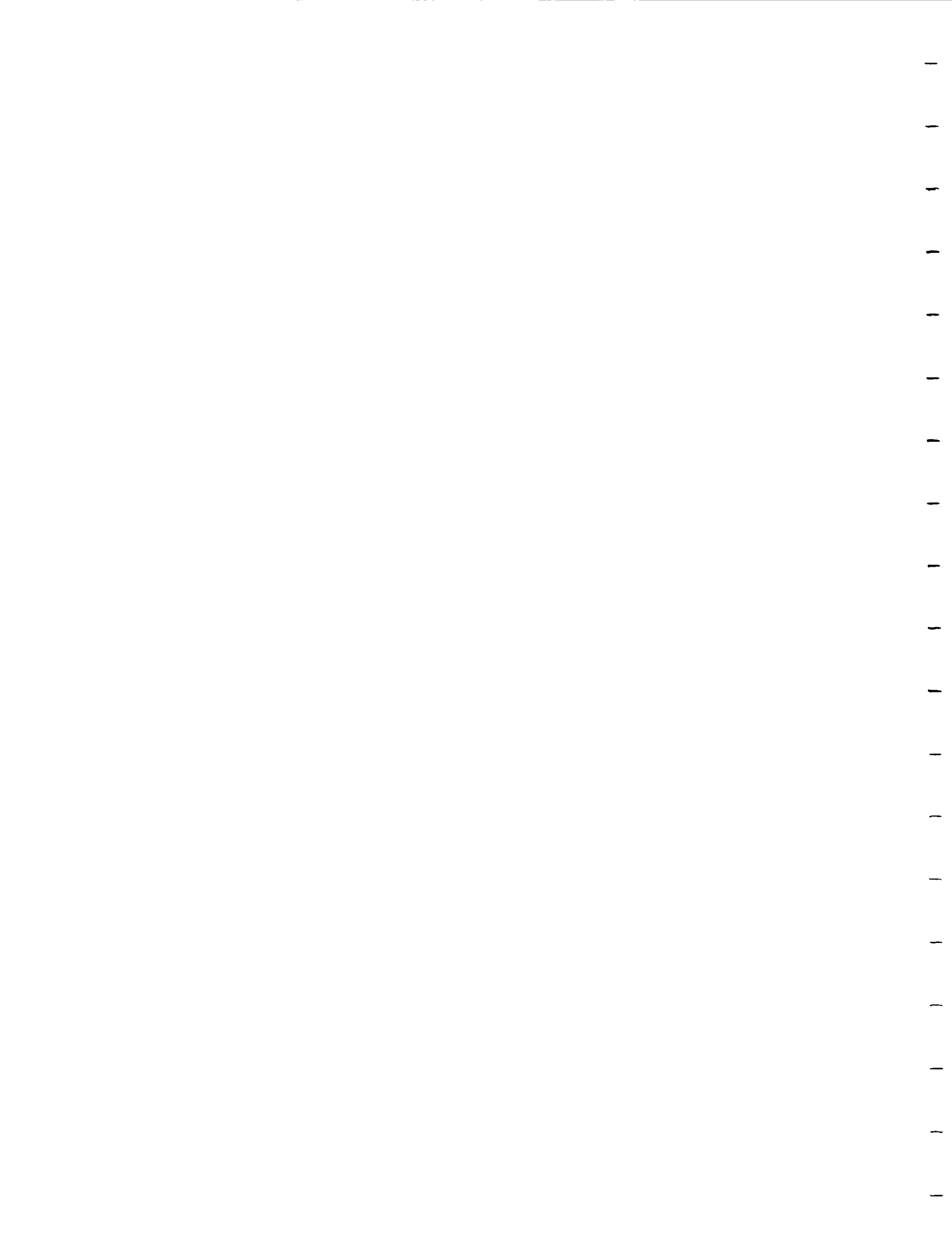
KDHE also noted in the March 13 letter that the Phase II investigation should include the following activities.

- ▶ Monitor wells are to be installed in the southeastern part of the MARCO site to allow investigation for free product and collection of groundwater samples in an area noted by KDHE to contain free product gasoline at a shallow depth.
- ▶ Monitor wells are to be installed along the eastern boundary of the site in an area where a black, oily substance was reportedly observed this year during trenching for installation of a fiber optic cable. It was reported that the apparent free product contamination flowed into the excavation in several locations at depths ranging from 3 to 7 feet.
- ▶ Utility trenches bordering the MARCO site are to be investigated as potential contamination migration pathways.
- ▶ Surface drainage routes from the MARCO site are to be investigated for off-site migration of contaminants.

1.3 Document Organization

This Work Plan describes our approach to meeting the objectives of Phase II of the MARCO CI. The scope of work to be performed is described in Section 2, and project deliverable submittal dates are provided in Section 3 of this document. Golder field activities at the MARCO site will be performed in accordance with the Site Safety Plan presented in Appendix A; this plan was prepared by a U.S. EPA contractor involved in site remediation activities. Golder field activities performed off-site will be in accordance with the Health and Safety Plan presented in Appendix B.

Estimated costs for Phase II of this project are provided under separate cover. In addition, background information pertinent to the CI is presented in the Phase I report (Golder 1998), and the Pace Analytical Services Quality Assurance Plan was previously submitted to KDHE. Golder Technical Procedures (TPs) cited in this Work Plan were provided to



KDHE as part of Golder's May 1997 submittal. Additional copies of these Standard Operating Procedures will be provided upon request.

2.0 SCOPE OF WORK

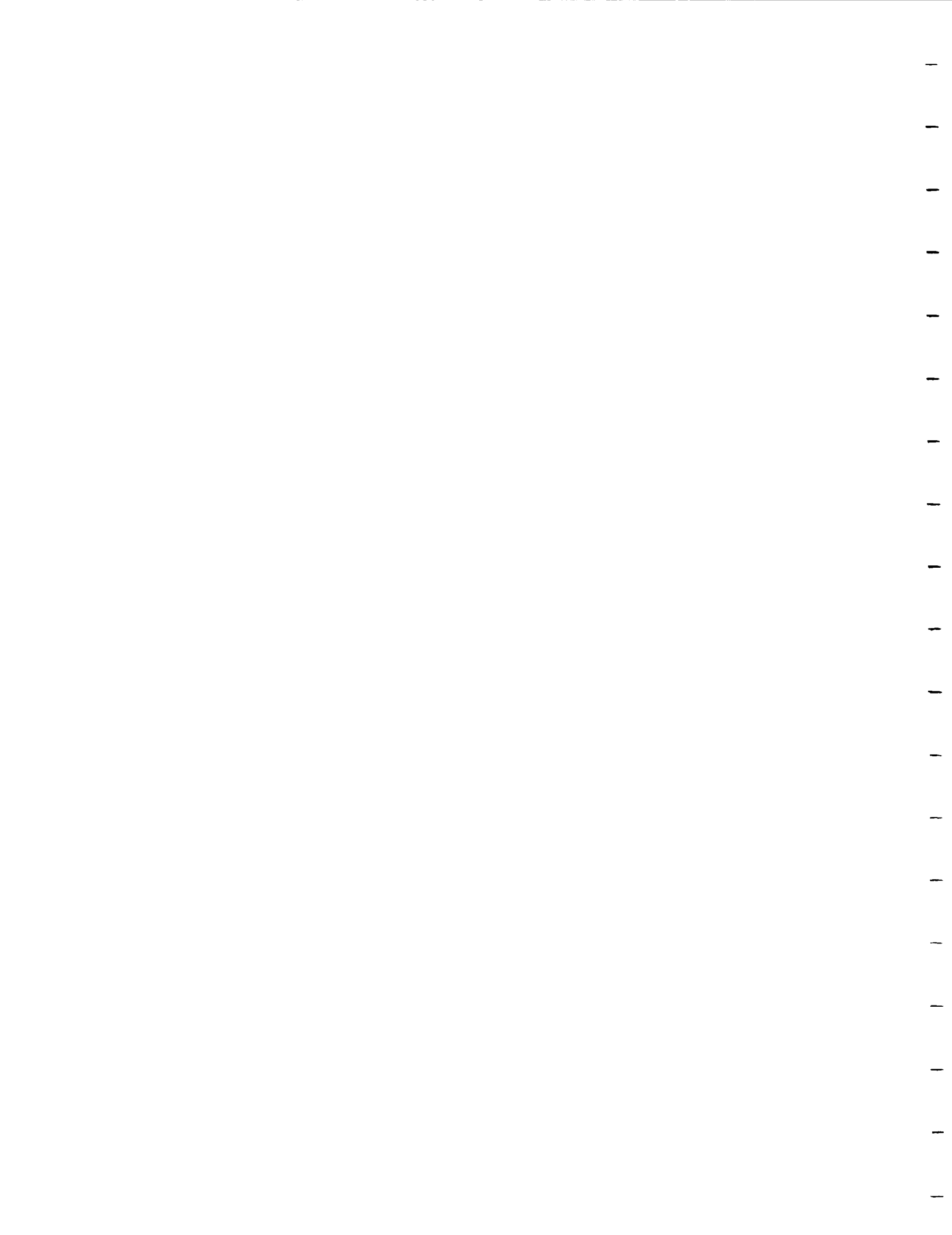
2.1 Phase II Investigation

Phase II investigative activities will be performed by Golder and our subcontractor, GeoCore Services Inc. (GeoCore) of Salina, Kansas, a State of Kansas licensed water well contractor. This work will conform to the Health and Safety Plans presented in Appendices A and B. Based on the current understanding of contamination in the areas to be investigated, Phase II work will be performed in Level D work attire. Tasks described in this Work Plan will be performed under the direction of a qualified geologist or engineer.

Prior to initiation of the Phase II drilling program, Golder will contact pertinent utility companies, obtain necessary utility clearances, and prepare/submit a KDHE Utility Clearance Checklist. Golder personnel will also meet with the appropriate landowners and U.S. EPA representatives to inspect the proposed drilling locations and discuss any logistical constraints that may be present.

2.1.1 Drilling and Well Installation

As summarized in Table 1, a total of 17 borehole locations are planned as part of the Phase II investigation. These boreholes are located in the vicinity of the southeast corner of the MARCO site (Figure 2), which is the area of maximum groundwater contamination (Golder 1998). Based on the current understanding of site conditions, the proposed investigative locations are near or hydraulically downgradient from the most likely



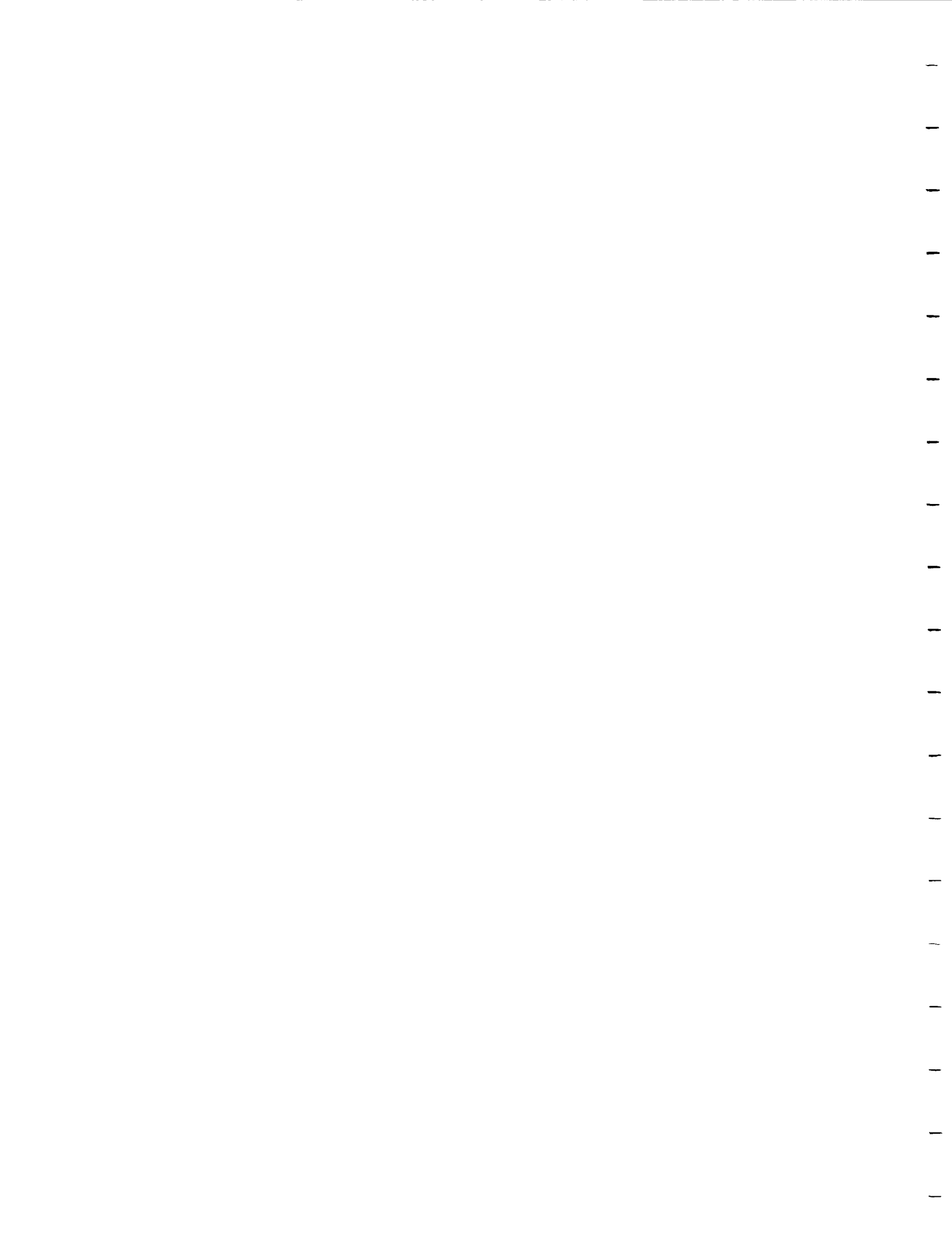
contaminant source areas. These investigative locations will be adjusted based on logistical constraints noted in the field.

Soil borings will be advanced using 4.25-inch ID (inside diameter) hollow stem augers and a CME continuous soil sampling system. Soil cores will be placed in core boxes and plastic bags for inspection and archiving; photographs will be taken of each soil/rock core. Geologic sample descriptions will be based on Golder TP 1.2-5 (Drilling, Sampling, and Logging of Soils), TP 1.2-6 (Field Identification of Soils), and the Unified Soil Classification System.

At a minimum, sections of soil core will be taken at 2-foot intervals or from obviously contaminated zones, isolated in plastic bags, and field screened for volatile organic contamination. Contaminant screening of these soil cores will be performed using a Photovac Microtip MP-1000 Photoionization Detector (PID). Prior to its use, the PID will be calibrated according to the manufacturer's instructions using 100 ppm isobutylene calibration gas. Intervals where the soil core PID readings exceed background levels will be recorded in the remarks column of the soil borehole logs.

Phase II monitoring wells will be installed and developed (Section 2.1.2) based on KDHE regulations (K.A.R. 28-30-2 and K.A.R. 28-30-6) and Golder TP 1.2-12 (Monitoring Well Drilling and Installation). The primary objectives of these tasks will be to allow: 1) collection of representative groundwater samples from the uppermost aquifer in the vicinity of the MARCO site; 2) comparison of water quality data from more than one sampling event; and 3) provision of wells suitable for collection of technically defensible hydraulic test data at some future date.

The monitor wells will be constructed using new, 2-inch ID (2 3/8-inch OD) Schedule 40, flush joint PVC riser pipe and 0.010-inch mill-slotted well screen. A threaded end cap will be placed on the bottom of each screen, and each threaded pipe joint will be wrapped with



Teflon tape. For above-grade completions, the PVC riser pipe will extend to approximately 2 feet above ground surface.

Sand pack material consisting of 20-40 grit Colorado Silica sand will be placed in the annulus between the PVC screen and the borehole wall. During placement, the depth to the top of the sand will be monitored with a weighted tape measure. Where conditions allow: 1) this sand pack will typically extend 2 feet above the well screen; 2) at least 2 feet of bentonite chips will be placed above the sandpack; and 3) cement grout will be placed to the ground surface.

Surface completions will be above-grade or flush-mount, depending on the proximity of the well to trafficked areas and other site-specific considerations. Flush-mount completions will be constructed if there are traffic concerns or concerns of appearance. For flush-mount completions, appropriate waiver requests will be submitted to the State of Kansas. It is anticipated that these completions will include 7-inch manways with 2-foot square by 6-inch thick concrete pads that slope away from the manway covers. A lockable cap will be placed on each well. The surface completions will be painted as appropriate for visibility.

After completion of the monitor wells, the wells will be labeled in accordance with Kansas regulations. State of Kansas Site I.D. Forms will be submitted to KDHE for each of the wells. Associated surveying will be performed by a State of Kansas Registered Land Surveyor.

Monitor wells installed in connection with Phases I and II could ultimately be used for the possible future hydraulic testing program cited in Section 1.2. In addition, drilling performed in connection with the Phase II well installation program will allow collection of relatively undisturbed samples of the silty clay aquitard, and laboratory testing to determine the vertical hydraulic conductivity of this unit. It is anticipated that vertical hydraulic conductivity testing will be performed on three silty clay samples.

Boreholes not converted to monitor wells will be plugged per State requirements. Granular, high solids sodium bentonite, bentonite grout, or cement grout will be used to seal such borings to just below the ground surface, then surface materials will be restored to their original condition, to the extent practical.

2.1.1.1 Well Installation in the Surficial Sand

It is anticipated that at least ten boreholes will be drilled to investigate the surficial sand unit previously encountered near the southeast corner of the MARCO property. Although this unit is laterally discontinuous, where present, this silty to clayey sand unit typically extends from approximately 1 to 4 feet below ground surface. For planning purposes, it is assumed that these boreholes will extend to a depth of approximately 6 feet. Three boreholes (B-23, B-27, and B-28) will be drilled downgradient of the MARCO site immediately east of Santa Fe Avenue, and seven boreholes (B-31 through B-37) will be drilled near the southeastern corner of the MARCO site in the vicinity of the area where gasoline free product was reported (Section 1.2). Monitor wells installed in the unconfined, surficial sand aquifer will be screened at depths appropriate to enable detection of LNAPL-type free product contaminants at the top of the water table.

Additional Phase II investigative locations are anticipated, particularly to investigate utility trenches bordering the MARCO site as potential contaminant migration pathways (Figure 3) and the area north of well M1. The actual locations of these supplemental boreholes will be determined based on: 1) information obtained from utility locator personnel; and 2) logistical constraints noted in the field. Monitor wells will be installed in each borehole where a monitorable groundwater flow zone is encountered.

2.1.1.2 Well Installation in the Uppermost Aquifer

It is anticipated that a total of six monitor wells will be screened in the upper portion of the Cottage Grove Sandstone and the sand and gravel unit that immediately overlies the bedrock unit. This flow zone is considered the uppermost aquifer that is laterally continuous in the site-vicinity. For planning purposes, it is assumed that these boreholes will be drilled to a depth of 24 feet. Two wells (B-24 and B-26) will be installed in the area of maximum groundwater contamination immediately southeast of the MARCO property. Two additional wells (B-21 and B-22) will be installed further downgradient to allow further evaluation of the horizontal extent of contamination in this groundwater flow zone. Finally, two wells (B-29 and B-30) will be installed along the railroad spur located east of the site in an area of relatively high TPH concentrations, as indicated by the Phase I investigation.

2.1.1.3 Well Installation in the Deeper Bedrock

One deeper well (B-25) will be installed in the area of maximum groundwater contamination. To prevent introduction of a possible pathway for migration of contaminants from the uppermost aquifer to a lower flow zone, the borehole will be sealed through the uppermost aquifer prior to coring approximately 15 feet into relatively competent rock. This will be accomplished by installing and grouting nominal 5-inch diameter surface casing to a depth of approximately 24 feet, rock coring to the borehole termination depth, and reaming the interval from 24 to 39 feet to a diameter of 4.75 inches prior to setting the monitor well.

This deeper monitoring point will allow: 1) characterization of the bedrock interval that could function as an aquitard to downward migration of contaminants; 2) screening and monitoring of the strata present below the highly weathered bedrock; 3) evaluation of the vertical gradient between the uppermost aquifer and the deeper strata; 4) evaluation of the

vertical extent of groundwater contamination; and 5) possible future evaluation of the degree of hydraulic connection between the uppermost aquifer and the deeper bedrock based on hydraulic testing.

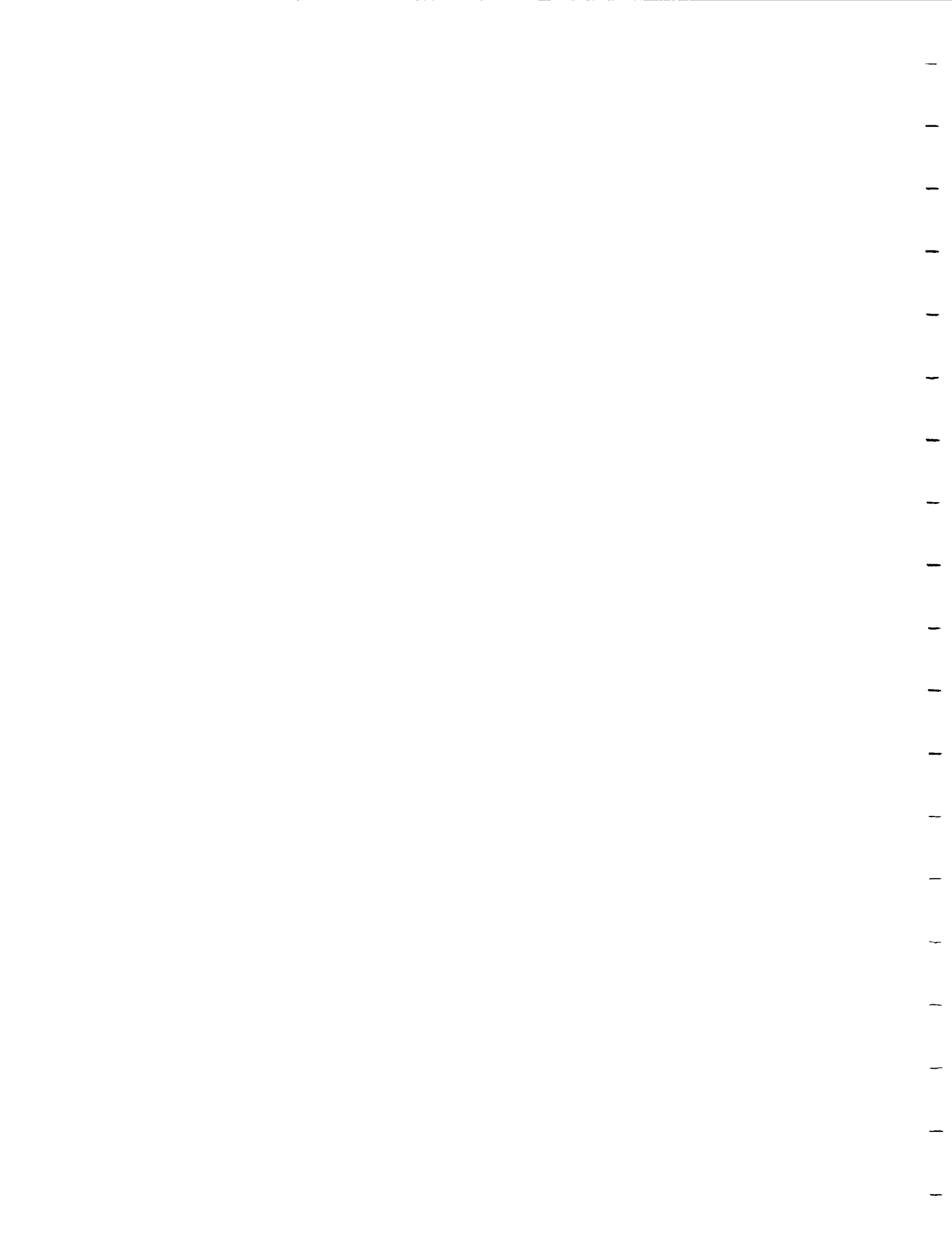
2.1.2 Well Development

The monitor wells will be developed by purging at least five casing volumes from each well using bailers and/or submersible pumps. If additional purging is necessary, well development will continue until field parameters (pH, conductivity, and temperature) stabilize and the groundwater is sufficiently free of sediment.

2.1.3 Groundwater Monitoring and Analysis

The Phase I conclusions are largely based on the groundwater monitoring event performed in December 1997. Instead of basing the subsequent corrective action evaluation on a single sampling event, Phase II will include an additional groundwater monitoring event to allow confirmation of the December 1997 water quality results. To allow partial evaluation of seasonal variations in the groundwater flow regime, Phase II monitoring will also include comprehensive measurement of water levels in site-vicinity wells, including the KDHE well, Phase I wells, and Phase II wells.

Sampling procedures will be based on Golder TP 1.2-20 (Collection of Groundwater Quality Samples) and TP 1.2-23 (Chain of Custody). Sampling personnel will wear disposable latex gloves throughout the sampling activities. Groundwater samples will be placed in laboratory-prepared bottles with the appropriate preservatives. Immediately after collection, sample containers will be wiped clean, checked to ensure caps are secure, and placed in an ice-filled cooler. The samples will then be delivered or shipped to the laboratory under strict chain-of-custody procedures.



Groundwater monitoring parameters, analytical methods, and reporting limits are shown in Tables 2 through 4. The anticipated analytical laboratory testing program is summarized in Table 5. In addition to two trip blanks, it is assumed that the QA/QC program will include a total of approximately 15 duplicate samples. Environmental testing performed by Pace Analytical Services, Inc. (Pace) will include VOC (modified method 8021), semi-VOC (method 8270), and RCRA metal analyses. Analytical testing will be performed in accordance with U.S. EPA SW-846 and the methods and QA/QC protocol described in the Pace Quality Assurance Plan previously submitted to KDHE. Standard analytical turnaround will be 14 days.

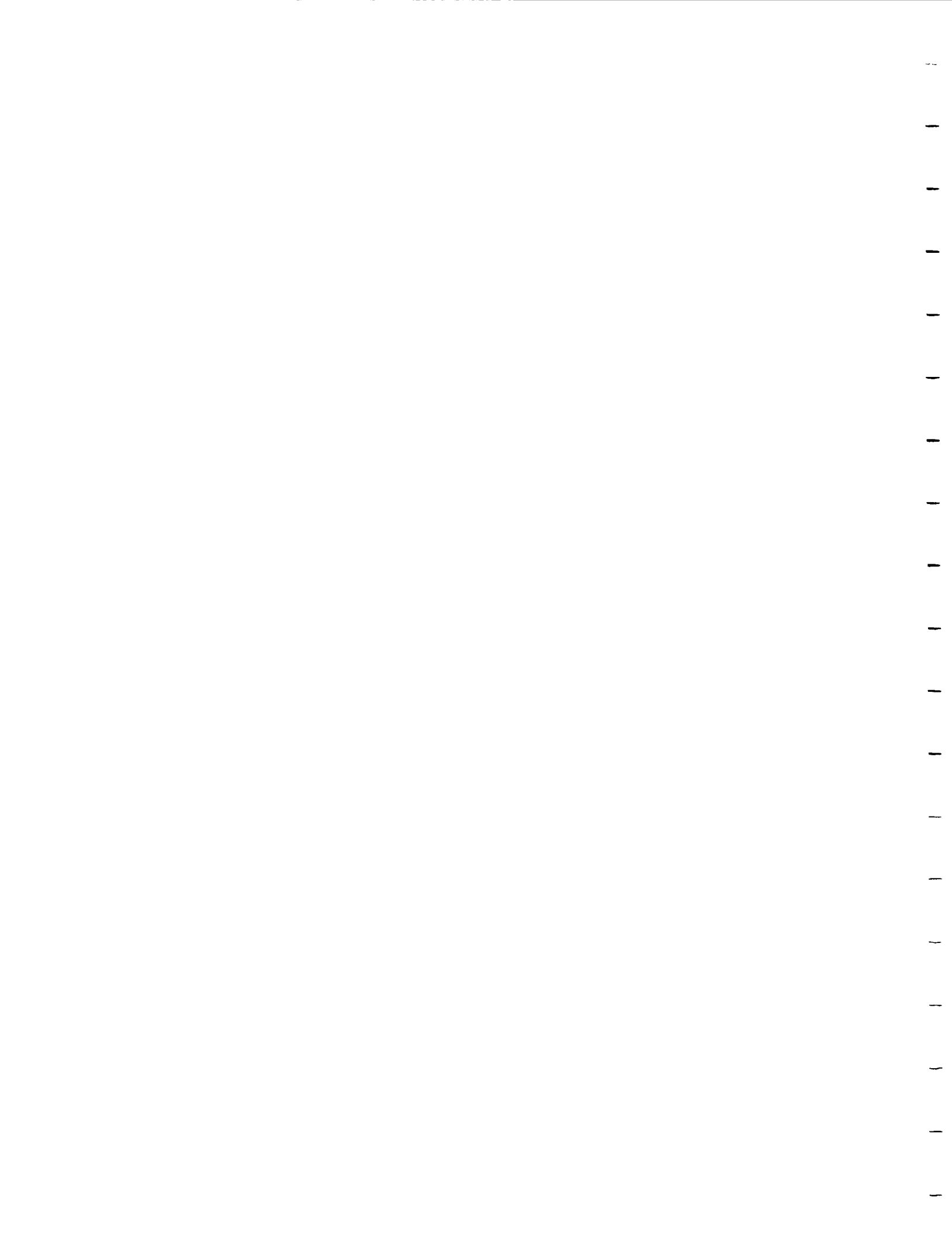
2.1.4 Soil/Sediment Sampling and Analysis

In connection with drilling of the monitor well boreholes, the continuous soil samples will be screened for VOC contamination. For each borehole, the most contaminated sample collected from above the saturated zone will be submitted to Pace for VOC (modified method 8021), semi-VOC (method 8270), and RCRA metal analyses, as summarized in Table 5.

In addition, three to five sediment samples will be collected from the surface drainage routes located east of the MARCO site, and a background soil sample will be collected at an upgradient location. These sampling locations will be determined in the field in consultation with KDHE. These samples will also be analyzed for VOCs, semi-VOCs, and RCRA metals.

2.1.5 Investigation Derived Waste

Waste generated during the field activities will be containerized and staged in DOT - approved 55-gallon drums pending disposal. If PID (photo ionization detector) monitoring indicates that total VOC levels in the drill cuttings are below 1.0 ppm, these cuttings will



be spread out on the ground in an area deemed suitable by KDHE. Soils with VOC levels above 1.0 ppm will be staged at the MARCO site pending results of analytical laboratory testing.

Water or fluids produced during the investigation will be containerized and staged at the MARCO site for treatment under the direction of the U.S. EPA. Although it was anticipated that the Phase II field program would also include carbon treatment of contaminated groundwater collected during the Phase I and II investigations, the U.S. EPA has agreed to accept these fluids for on-site treatment.

2.2 Data Analyses

Data analyses to be performed under this task will include: 1) analysis of the Phase II subsurface data, resulting in refinement of the conceptual hydrogeologic model for the MARCO site-vicinity; 2) integration of additional soil and water quality data into the resulting model; and 3) analysis of the potentiometric test data collected during the investigative phases. These analyses will be presented in the form of hydrogeologic cross sections, potentiometric maps, and contaminant concentration maps.

2.3 Comprehensive Investigation Report

The major deliverable for the project will be the Comprehensive Investigation Report. This report will describe in detail the work completed to accomplish the objectives described in Section 1.1 of this Work Plan and will present the data collected from the Phase I and II investigations. In addition to the analytical output generated under Task 6, the CI Report will include at least the following.

- ▶ Information on the site history, geologic and hydrogeologic conditions, and groundwater quality pertinent to the CI, including a description of the groundwater flow direction in the study area

- ▶ Results and documentation of the contaminant source and nature/extent characterization
- ▶ A description of any human and/or environmental contaminant receptors in the study area downgradient from the site
- ▶ An initial list of potential corrective actions to address off-site contamination from the MARCO site

Background information or technical literature used in the CI will be provided in an appendix, or will be cited in a reference list. As specified in the KDHE SOW, the CI Report will include field notes and a color photographic log of significant investigation components.

To obtain KDHE input and comments, two copies of the draft version of the CI Report will be submitted for KDHE review. After incorporating KDHE comments, three copies of the final version of the CI Report will be submitted, including two bound copies and one unbound copy.

2.4 Project Management

Randy March will serve as the Project Manager. Mr. March, an Associate with Golder Associates, has M.S. and B.S. degrees in Geological Engineering, a B.S. in Geology, and 16 years of pertinent experience. Mr. March is a Professional Geological Engineer and a Professional Geologist.

Mr. March will be the primary contact for KDHE and will be responsible for project coordination, technical direction, and financial performance during the life of the project, including: 1) direction of Golder's technical approach and project deliverables; 2) contractual arrangements and coordination with potential subcontractors for the project; 3) monthly invoicing; 4) preparation of brief monthly reports that will accompany the invoices; and 5) ensuring that KDHE is kept apprised of project developments.

3.0 SCHEDULE

Phase II of the MARCO CI project was started on March 13, 1998 when Golder received the letter from KDHE describing the SOW. Actual or anticipated project milestones and deliverable requirements are as follows.

- ▶ March 13, 1998 - Phase II SOW issued
- ▶ March 24, 1998 - Draft Phase II Work Plan issued
- ▶ March 31, 1998 - Phase II Work Plan finalized
- ▶ April 1, 1998 - Field team mobilized
- ▶ April 11, 1998 - Complete Phase II field investigation
- ▶ April 27, 1998 - Complete analytical laboratory testing
- ▶ May 18, 1998 - Complete Phase II data evaluation
- ▶ June 1, 1998 - Issue draft CI Report
- ▶ June 15, 1998 - Receive comments on draft CI Report
- ▶ June 22, 1998 - Issue final version of CI Report

If desired, Golder will work with KDHE to accelerate the schedule where practical.

TABLES

TABLE 1

SUMMARY OF PHASE II INVESTIGATIVE LOCATIONS

Proposed Borehole	Location Relative to MARCO Site ³	Target Zone for Monitor Well	Assessed Depth (ft.)
B-21	350 feet east	Sand/gravel aquifer, and upper bedrock ¹	24
B-22	240 feet southeast	Sand/gravel aquifer, and upper bedrock	24
B-23	Immediately east of Santa Fe Ave.	Surficial sand ²	6
B-24	Immediately east of Santa Fe Ave.	Sand/gravel aquifer, and upper bedrock	24
B-25	Immediately east of Santa Fe Ave.	Deeper bedrock	39
B-26	Immediately east of Santa Fe Ave.	Sand/gravel aquifer, and upper bedrock	24
B-27	Immediately east of Santa Fe Ave.	Surficial sand	6
B-28	Immediately east of Santa Fe Ave.	Surficial sand	6
B-29	390 feet east along railroad spur	Sand/gravel aquifer, and upper bedrock	24
B-30	500 feet east along railroad spur	Sand/gravel aquifer, and upper bedrock	24
B-31	Southeastern corner of MARCO site	Surficial sand	6
B-32	Southeastern corner of MARCO site	Surficial sand	6
B-33	Southeastern corner of MARCO site	Surficial sand	6
B-34	Southeastern corner of MARCO site	Surficial sand	6
B-35	Southeastern corner of MARCO site	Surficial sand	6
B-36	Southeastern corner of MARCO site	Surficial sand	6
B-37	Southeastern corner of MARCO site	Surficial sand	6

Notes:

1. The noted groundwater flow zone targeted for installation of monitor wells is the upper portion of the Cottage Grove Sandstone and the sand and gravel stratum that immediately overlies the bedrock unit. This flow zone is considered the uppermost aquifer that is laterally continuous in the site-vicinity.
2. The noted groundwater flow zone targeted for installation of monitor wells is a surficial sand unit encountered near the southeast corner of the MARCO property. Although this unit is laterally discontinuous, where present, this silty to clayey sand unit typically extends from approximately 1 to 4 feet below ground surface.
3. Additional Phase II investigative locations are anticipated, particularly to investigate utility trenches bordering the MARCO site as potential contaminant migration pathways. The actual locations of these supplemental boreholes will be determined based on: 1) information obtained from utility locator personnel; and 2) logistical constraints noted in the field.

TABLE 2

VOLATILE ORGANIC ANALYTES

Analyte	EPA Method Soil	EPA Method Water	Pace Reporting Limit		CAS Number
			Soil ug/kg	Water ug/L	
GC Volatile Organic Compounds					
Chloromethane	8021	8021	0.8	0.8	74-87-3
Vinyl Chloride	8021	8021	1.8	1.8	75-01-4
Bromomethane	8021	8021	3.0	3.0	74-83-9
Chloroethane	8021	8021	5.2	5.2	75-00-3
Trichlorofluoromethane	8021	8021	5.0	5.0	75-69-4
1,1-Dichloroethene	8021	8021	1.3	1.3	75-35-4
Methylene Chloride	8021	8021	2.5	2.5	75-09-2
trans-1,2-Dichloroethene	8021	8021	1.0	1.0	156-60-5
1,1-Dichloroethane	8021	8021	0.7	0.7	75-34-3
Chloroform	8021	8021	0.5	0.5	67-66-3
1,1,1-Trichloroethane	8021	8021	0.5	0.5	71-55-6
Carbon Tetrachloride	8021	8021	1.2	1.2	56-23-5
Benzene	8021	8021	2.0	2.0	71-43-2
1,2-Dichloroethane	8021	8021	0.5	0.5	107-06-2
cis-1,3-Dichloropropene	8021	8021	3.4	3.4	10061-01-5
Trichloroethene	8021	8021	1.2	1.2	79-01-6
1,2-Dichloropropane	8021	8021	0.5	0.5	78-87-5
Bromodichloromethane	8021	8021	1.0	1.0	75-27-4
Toluene	8021	8021	2.0	2.0	108-88-3
1,1,2-Trichloroethane	8021	8021	0.5	0.5	79-00-5
trans-1,3-Dichloropropene	8021	8021	0.6	0.6	10061-02-6
Tetrachloroethene	8021	8021	0.5	0.5	127-18-4
Dibromochloromethane	8021	8021	0.9	0.9	124-48-1
Chlorobenzene	8021	8021	0.7	0.7	108-90-7
Ethylbenzene	8021	8021	2.0	2.0	
Bromoform	8021	8021	2.0	2.0	75-25-2
1,1,2,2-Tetrachloroethane	8021	8021	0.5	0.5	79-34-5
2-Chloroethyl Vinyl Ether	8021	8021	1.3	1.3	110-75-8
Xylene (Total)	8021	8021	7.0	7.0	1330-20-7
1,3-Dichlorobenzene	8021	8021	1.0	1.0	541-73-1
1,4-Dichlorobenzene	8021	8021	1.0	1.0	106-46-7
1,2-Dichlorobenzene	8021	8021	1.0	1.0	95-50-1
Bromochloromethane (S)					74-97-5
1,4-Dichlorobutane (S)					110-56-5
a,a,a-Trifluorotoluene (S)					2164-17-2
Sample Container Holding Time Requirements					
Parameter	Method	Matrix	Container Type	Preservative	Holding Time
GC Volatile Organics	8021	Water	40 mL VOA vial	HCl, 4 C	14 Days
GC Volatile Organics	8021	Soil	4 oz. soil jar	4 C	14 Days

TABLE 3

SEMI-VOLATILE ORGANIC ANALYTES

Analyte	EPA Method Soil	EPA Method Water	Pace Reporting Limit		CAS Number
			Soil ug/kg	Water ug/L	
GCMS Semi-Volatile Organic Compounds					
Phenol	8270	8270	330	10	108-95-2
bis(2-Chloroethyl)ether	8270	8270	330	10	111-44-4
2-Chlorophenol	8270	8270	330	10	95-57-8
1,3-Dichlorobenzene	8270	8270	330	10	541-73-1
1,4-Dichlorobenzene	8270	8270	330	10	106-46-7
Benzyl Alcohol	8270	8270	660	20	100-51-6
1,2-Dichlorobenzene	8270	8270	330	10	95-50-1
2-Methylphenol	8270	8270	330	10	95-48-7
bis(2-Chloroisopropyl)ether	8270	8270	330	10	39638-32-9
4-Methylphenol	8270	8270	330	10	106-44-5
N-Nitroso-di-n-propylamine	8270	8270	330	10	621-64-7
Hexachloroethane	8270	8270	330	10	67-72-1
Nitrobenzene	8270	8270	330	10	98-95-3
Isophorone	8270	8270	330	10	78-59-1
2-Nitrophenol	8270	8270	330	10	88-75-5
2,4-Dimethylphenol	8270	8270	330	10	105-67-9
Benzoic Acid	8270	8270	1600	50	65-85-0
bis(2-Chloroethoxy)methane	8270	8270	330	10	111-91-1
2,4-Dichlorophenol	8270	8270	330	10	120-83-2
1,2,4-Trichlorobenzene	8270	8270	330	10	120-82-1
Naphthalene	8270	8270	330	10	91-20-3
4-Chloroaniline	8270	8270	660	20	106-47-8
Hexachlorobutadiene	8270	8270	330	10	87-68-3
4-Chloro-3-methylphenol	8270	8270	660	20	59-50-7
2-Methylnaphthalene	8270	8270	330	10	91-57-6
Hexachlorocyclopentadiene	8270	8270	330	10	77-47-4
2,4,6-Trichlorophenol	8270	8270	330	10	88-06-2
2,4,5-Trichlorophenol	8270	8270	330	50	95-95-4
2-Chloronaphthalene	8270	8270	330	10	91-58-7
2-Nitroaniline	8270	8270	1600	50	88-74-4
Dimethylphthalate	8270	8270	330	10	131-11-3
Acenaphthylene	8270	8270	330	10	208-96-8
2,6-Dinitrotoluene	8270	8270	330	10	606-20-2
3-Nitroaniline	8270	8270	1600	50	99-09-2
Acenaphthene	8270	8270	330	10	83-32-9
2,4-Dinitrophenol	8270	8270	1600	50	51-28-5
4-Nitrophenol	8270	8270	1600	50	100-02-7
Dibenzofuran	8270	8270	330	10	132-64-9
2,4-Dinitrotoluene	8270	8270	330	10	121-14-2
Diethylphthalate	8270	8270	330	10	84-66-2
4-Chlorophenyl-phenylether	8270	8270	330	10	7005-72-3
Fluorene	8270	8270	330	10	86-73-7

TABLE 3

SEMI-VOLATILE ORGANIC ANALYTES

Analyte	EPA Method Soil	EPA Method Water	Pace Reporting Limit		CAS Number
			Soil ug/kg	Water ug/L	
4-Nitroaniline	8270	8270	1600	50	100-01-6
4,6-Dinitro-2-methylphenol	8270	8270	1600	50	534-52-1
N-Nitrosodiphenylamine	8270	8270	330	10	86-30-6
4-Bromophenyl-phenylether	8270	8270	330	10	101-55-3
Hexachlorobenzene	8270	8270	330	10	118-74-1
Pentachlorophenol	8270	8270	1600	50	87-86-5
Phenanthrene	8270	8270	330	10	85-01-8
Anthracene	8270	8270	330	10	120-12-7
Di-n-butylphthalate	8270	8270	330	10	84-74-2
Fluoranthene	8270	8270	330	10	206-44-0
Pyrene	8270	8270	330	10	129-00-0
Butylbenzylphthalate	8270	8270	330	10	85-68-7
3,3'-Dichlorobenzidine	8270	8270	660	20	91-94-1
Benzo(a)anthracene	8270	8270	330	10	56-55-3
Chrysene	8270	8270	330	10	218-01-9
bis(2-Ethylhexyl)phthalate	8270	8270	330	10	117-81-7
Di-n-octylphthalate	8270	8270	330	10	117-84-0
Benzo(b)fluoranthene	8270	8270	330	10	205-99-2
Benzo(k)fluoranthene	8270	8270	330	10	207-08-9
Benzo(a)pyrene	8270	8270	330	10	50-32-8
Indeno(1,2,3-cd)pyrene	8270	8270	330	10	193-39-5
Dibenz(a,h)anthracene	8270	8270	330	10	53-70-3
Benzo(g,h,i)perylene	8270	8270	330	10	191-24-2
Sample Container Holding Time Requirements					
Parameter	Method	Matrix	Container Type	Preservative	Holding Time
GCMS Semi-Volatile Organics	8270	Water	1 Glass Amber	4 C	7/40 Days
GCMS Semi-Volatile Organics	8270	Soil	4 oz. soil jar	4 C	14/40 Days

TABLE 4

RCRA METALS

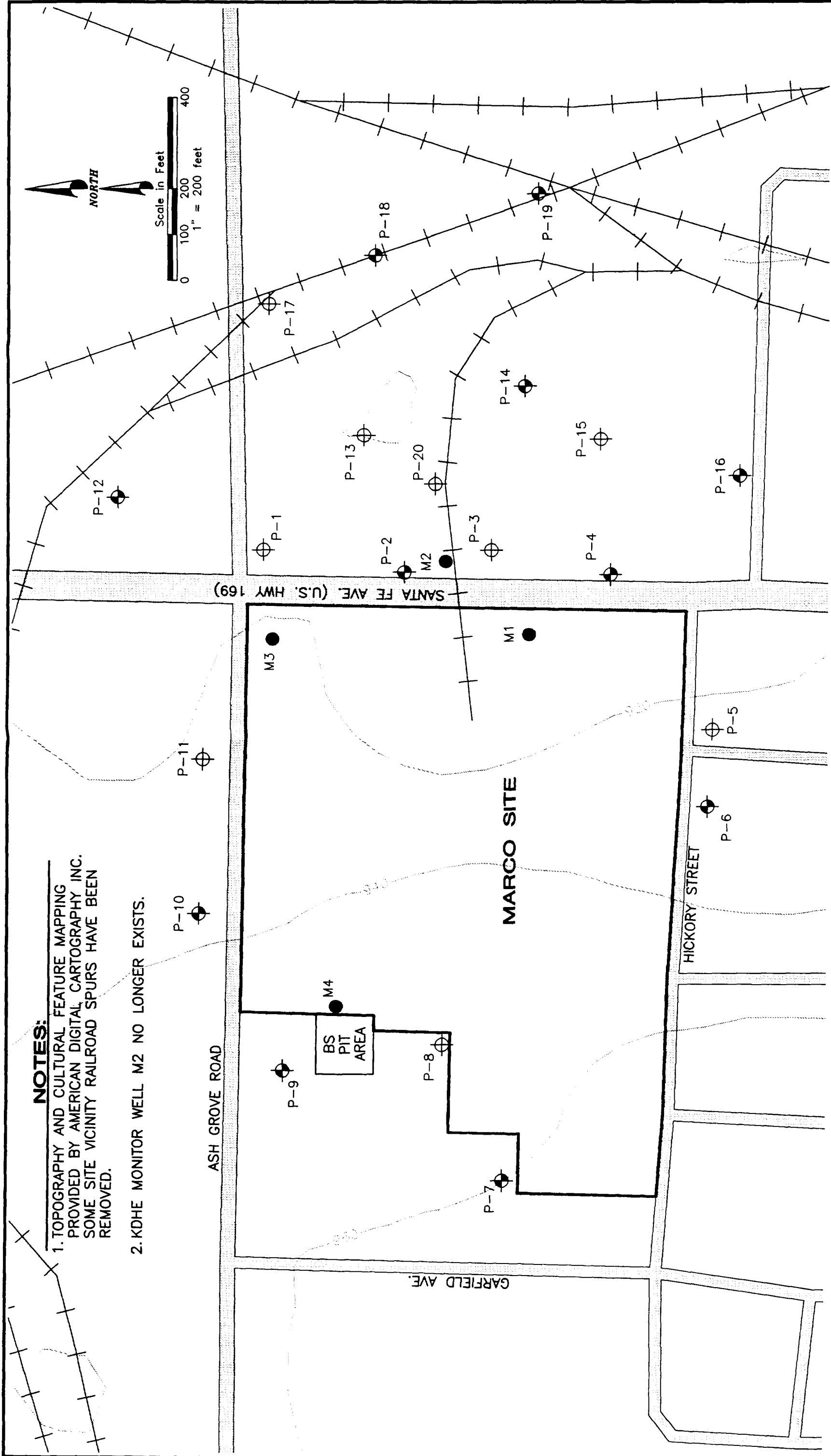
Analyte	EPA Method Soil	EPA Method Water	Pace Reporting Limit		CAS Number
			Soil ug/kg	Water ug/L	
Metals by ICP					
Arsenic	6010	6010	8.5	85	7440-38-2
Barium	6010	6010	0.4	4	7440-39-3
Cadmium	6010	6010	0.5	5	7440-43-9
Chromium	6010	6010	0.7	7	7440-47-3
Lead	6010	6010	5	50	7439-92-1
Selenium	6010	6010	10	100	7782-49-2
Silver	6010	6010	0.7	7	7440-22-4
Metals by Furnace:					
Mercury	7471	7470	0.1 mg/kg	.2 ug/L	7439-97-6

TABLE 5

ASSUMED ANALYTICAL TESTING PROGRAM

	Groundwater Analytical Samples		Soil Analytical Samples	
	Mod. 8021	RCRA Metals	Method 8270	Method 8270
<i>Anticipated Sampling Locations</i>				
P-2, P-4, P-6, P-14, P-16, P-18, P-19, M1	8			
B-21 through B-37	17	17	17	17
P-2, P-4, B-31 through B-34, plus 3 supplemental			9	
B-24, B-25, B-27, B-28, B-33				
Surface drainage sediments			5	5
<i>Anticipated Sample Totals</i>				
QA/QC Samples	5	2	1	3
Total Samples	30	19	10	25

FIGURES




NOTES:

- 1. TOPOGRAPHY AND CULTURAL FEATURE MAPPING PROVIDED BY AMERICAN DIGITAL CARTOGRAPHY INC. SOME SITE VICINITY RAILROAD SPURS HAVE BEEN REMOVED.
- 2. KDHE MONITOR WELL M2 NO LONGER EXISTS.

LEGEND

- ⊕ P-1 PROBE LOCATION
- ⊕ P-2 PROBE AND 1" WELL LOCATION
- M3 PREVIOUS KDHE MONITOR WELL

 Golder Associates Denver, Colorado		TITLE	
CLIENT/PROJECT		MARCO INVESTIGATION	
KDHE		PHASE I	
INVESTIGATIVE LOCATIONS		INVESTIGATIVE LOCATIONS	
DRAWN	DB/RB	DATE	JOB NO.
CHECKED	MJK	MARCH 1998	973-2300.3
REVIEWED	RSM	SCALE	DWG. NO./REV. NO.
		AS SHOWN	B008
		FILE NO.	FIGURE NO.
		2300B008	1

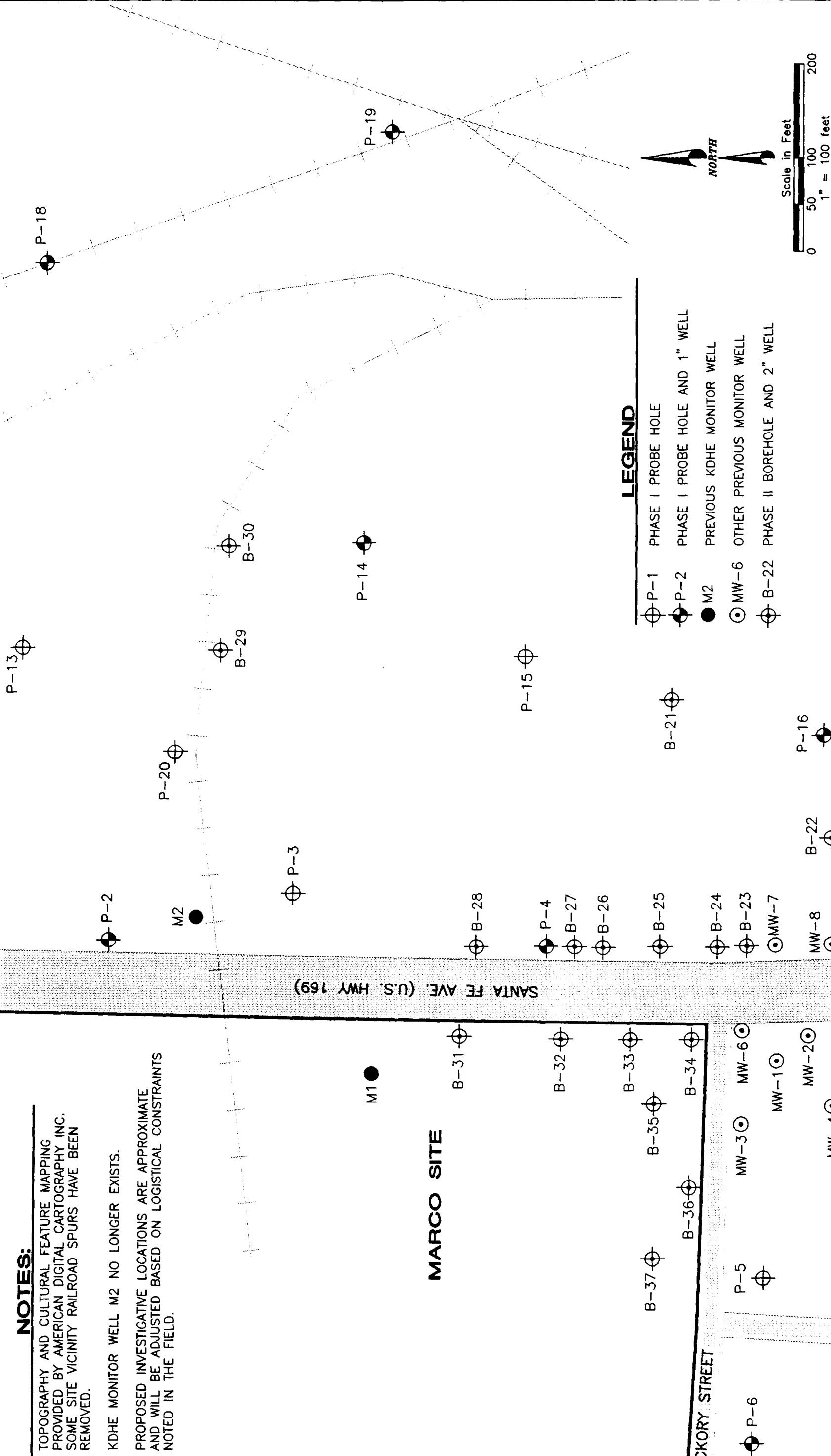
NOTES:

- 1. TOPOGRAPHY AND CULTURAL FEATURE MAPPING PROVIDED BY AMERICAN DIGITAL CARTOGRAPHY INC. SOME SITE VICINITY RAILROAD SPURS HAVE BEEN REMOVED.
- 2. KDHE MONITOR WELL M2 NO LONGER EXISTS.
- 3. PROPOSED INVESTIGATIVE LOCATIONS ARE APPROXIMATE AND WILL BE ADJUSTED BASED ON LOGISTICAL CONSTRAINTS NOTED IN THE FIELD.

MARCO SITE

SANTA FE AVE. (U.S. HWY 169)

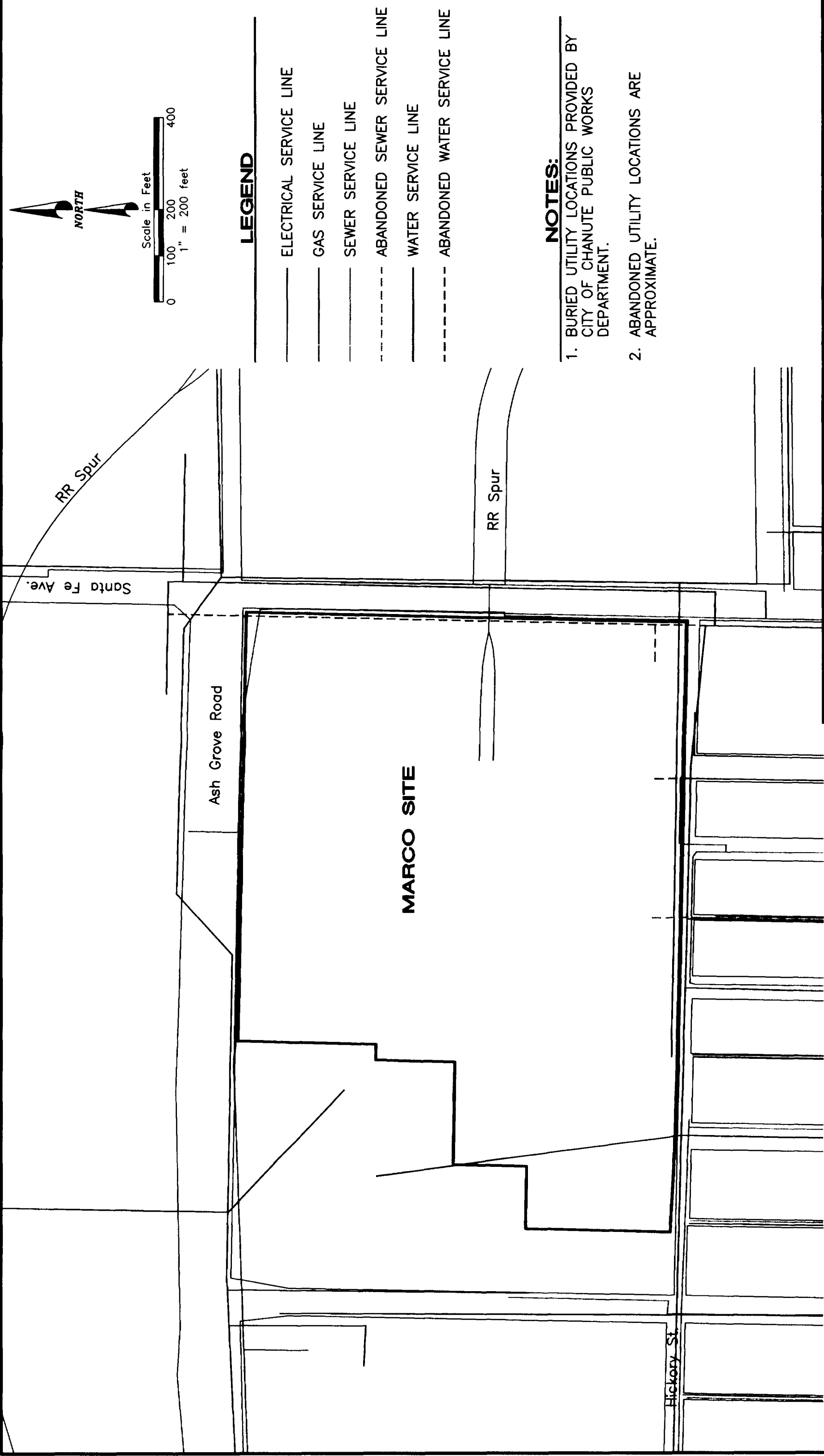
HICKORY STREET



LEGEND

- P-1 PHASE I PROBE HOLE
- P-2 PHASE I PROBE HOLE AND 1" WELL
- M2 PREVIOUS KDHE MONITOR WELL
- MW-6 OTHER PREVIOUS MONITOR WELL
- B-22 PHASE II BOREHOLE AND 2" WELL

Golder Associates		Denver, Colorado		PROPOSED PHASE II INVESTIGATIVE LOCATIONS	
CLIENT/PROJECT		KDHE MARCO INVESTIGATION		TITLE	
DRAWN		DB		DATE	
CHECKED		MJK		SCALE	
REVIEWED		RSM		FILE NO.	
				JOB NO. 973-2300.3	
				DWG. NO./REV. NO. B033	
				FIGURE NO. 2	



- NOTES:**
- BURIED UTILITY LOCATIONS PROVIDED BY CITY OF CHANUTE PUBLIC WORKS DEPARTMENT.
 - ABANDONED UTILITY LOCATIONS ARE APPROXIMATE.

LEGEND

- ELECTRICAL SERVICE LINE
- GAS SERVICE LINE
- SEWER SERVICE LINE
- - - - ABANDONED SEWER SERVICE LINE
- WATER SERVICE LINE
- - - - ABANDONED WATER SERVICE LINE

Golder Associates Denver, Colorado		BURIED UTILITIES NEAR MARCO SITE			
CLIENT / PROJECT		TITLE			
KDHE MARCO INVESTIGATION		DRAWN	RB	DATE	MARCH 1998
		CHECKED	RSM	SCALE	AS SHOWN
		REVIEWED	RSM	FILE NO.	2300B003
		JOB NO. 973-2300.3			
		DWG. NO./REV. NO. B003			
		FIGURE NO. 3			

APPENDIX A

SMITH TECHNOLOGY CORPORATION SITE SAFETY PLAN



SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN

Date: February 3, 1998

Project Name: Mid-America Refinery
Neosho County
Chanute, Kansas

Smith Job #: 9213

ERRS Delivery Order #: 68-S7-7001-013

Adopted By:

Janine J. Kresone
U.S. EPA On-Scene Coordinator

Date:

2/17/98

Adopted By:

Ronald L. Lybarger
Smith Response Manager

Date:

2/5/98

Adopted By:

Greg Rahus
Smith Safety Manager

Date:

2/3/98

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- ATTACHMENT B SITE MAPS
- ATTACHMENT C CHEMICAL HAZARD INFORMATION
- ATTACHMENT D PERSONAL PROTECTION EQUIPMENT AND RESPIRATORY PROTECTION SOP'S
- ATTACHMENT E ALCOHOL AND DRUG POLICY
- ATTACHMENT Z SITE SAFETY PLAN ACKNOWLEDGMENT FORM

OPTIONAL ATTACHMENTS**HAZARDS AND SOPS ASSOCIATED WITH:**

- F Confined Space
- G Heavy Equipment Operations
- H Excavation
- I Flammable Liquid Transfer
- J Use of High Pressure Water Clean-up
- K Heat Stress
- L Cold Stress
- M Work from Elevated Surfaces
- N Lock Out/Tag Out
- O Line Breaking
- P Hotwork

 Other: _____

GLOSSARY OF ACRONYMS

ANSI	- AMERICAN NATIONAL STANDARDS INSTITUTE
APR	- AIR PURIFYING RESPIRATOR
ACGIH	- AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS
CFR	- CODE OF FEDERAL REGULATIONS
CGI	- COMBUSTIBLE GAS INDICATOR
CLEAN ZONE	- SUPPORT ZONE
CSEP	- CONFINED SPACE ENTRY PERMIT
DECON	- DECONTAMINATION
HNU-PID	- HNU PHOTOIONIZATION DETECTOR
HOT ZONE	- EXCLUSION ZONE
IAW	- IN ACCORDANCE WITH
IDLH	- IMMEDIATELY DANGEROUS TO LIFE & HEALTH
MREM/hr	- MILLI-ROENTGENS EQUIVALENT IN MAN PER HOUR
NIOSH	- NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY & HEALTH
OSHA	- OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION LIMIT
OVA	- ORGANIC VAPOR ANALYZER
PAPR	- POWERED AIR PURIFYING RESPIRATORS
PEL	- PERMISSIBLE EXPOSURE LIMIT
PPM	- PARTS PER MILLION
RM	- RESPONSE MANAGER
SCBA	- SELF-CONTAINED BREATHING APPARATUS
SOP	- STANDARD OPERATING PROCEDURE
SPCC	- SPILL PREVENTION CONTROLS & COUNTERMEASURES
TLV	- THRESHOLD LIMIT VALUE
TWA	- TIME WEIGHTED AVERAGE
U.S. EPA	- U.S. ENVIRONMENTAL PROTECTION AGENCY



SMITH TECHNOLOGY CORPORATION SITE SAFETY PLAN

1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed for the Mid-America Refinery Site, to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes. The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. Specific requirements will be revised when new information is received or conditions change. A written amendment will document all changes made to the plan. Any amendments to this plan will be included in Attachment A. Where appropriate, specific OSHA standards or other guidance will be cited and applied.

All work practices and procedures implemented on site must be designated to minimize worker contact with hazardous materials and to reduce the possibility of physical injury. All work will be performed in accordance with applicable Federal 29CFR 1910 and 1926 Health and Safety Regulations and the Federal 29CFR 1910.120 Hazardous Waste Site Safety Regulations.

1.1 Daily Safety Meetings

Daily safety meetings will be held at the start of each shift to ensure that all personnel understand site conditions and operating procedures, to ensure that personal protective equipment is being used correctly and to address worker health and safety concerns.

1.2 Site Safety Plan Acceptance Acknowledgment

The Response Manager shall be responsible for informing all individuals entering the exclusion zone or decontamination zone of the contents of this plan and ensuring that each person signs the Safety Plan Acknowledgment Form in Attachment Z. By signing the Safety Plan Acknowledgment Form, individuals are recognizing the potential hazards present on-site and the policies and procedures required to minimize exposure or adverse effects of these hazards.

1.3 Key Personnel

U.S. EPA On-Scene Coordinator (OSC)/
Site Safety Officer:

Janice Kroone
726 Minnesota Ave.
Kansas City, KS 66101
913/551-7005

Principle Contractor:

Smith Technology Corporation
18207 Edison Avenue
Chesterfield, MO 63005

Response Manager:

Ron Lybarger

Safety Manager:

Greg Rakers

2.0 ROLES AND RESPONSIBILITIES**2.1 Response Manager (RM): Ron Lybarger**

The Response Manager, as the field representative for Smith and its subcontractors, has the responsibility for fulfilling the terms of the contract. The RM must oversee the project and ensure that all technical, regulatory and safety requirements are met. The Response Manager is the on site Health and Safety Officer (HSO) when the HSO is not on site. The Response Manager is responsible for the duties listed in Section 2.2.

2.2 Site Health and Safety Officer (HSO): Greg Rakers

The Smith Site Safety Officer will be assigned to the site on a full-time basis with functional responsibility for implementing the Site Health and Safety Plan as it applies to Smith personnel.

Specific Duties Include:

- a. Assume responsibility for health and safety of personnel.
- b. Supervise confined space entries.
- c. Document safety problems.
- d. Supervise decontamination of personnel and equipment.
- e. Ensure that monitoring equipment is calibrated/operational
- f. Conduct personal air monitoring on all employees as outlined in 29CFR 1910.120(h)(4).
- g. Perform respiratory fit tests.
- h. Inventory/inspect PPE prior to personnel entries.
- i. Prepare summary letter of personal air sampling results.
- j. Select protective equipment levels based upon chemical properties, method of contact and air sample results.
- k. Prepare and maintain OSHA Log within 3 days of accident.
- l. Insure all personnel are fit for duty.
- m. Competent person for excavation/trench entry jobs.
- n. Inspect first aid kits/fire extinguishers/SCBA.

2.3 Other:

Any persons who observe safety problems should immediately report observations/concerns to appropriate key personnel listed in Section 2.1 or 2.2 above.



SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN

SUBCONTRACTORS

COMPANY NAME			
CONTACT NAME			
PHONE			
ADDRESS			
SCOPE OF WORK			
TRAINING REQUIRED? (CHECK ONE)	<input type="checkbox"/> YES	<input type="checkbox"/> NO	DESCRIBE:
CONTRACTOR PREQUALIFIED?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	

COMPANY NAME			
CONTACT NAME			
PHONE			
ADDRESS			
SCOPE OF WORK			
TRAINING REQUIRED? (CHECK ONE)	<input type="checkbox"/> YES	<input type="checkbox"/> NO	DESCRIBE:
CONTRACTOR PREQUALIFIED?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	

COMPANY NAME			
CONTACT NAME			
PHONE			
ADDRESS			
SCOPE OF WORK			
TRAINING REQUIRED? (CHECK ONE)	<input type="checkbox"/> YES	<input type="checkbox"/> NO	DESCRIBE:
CONTRACTOR PREQUALIFIED?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	

3.0 SITE BACKGROUND AND SCOPE OF WORK

3.1 Site Background

Site Description

The Mid-America Refinery Company is Chanute, Kansas, is a 25-acre abandoned oil refinery. This facility operated as a crude oil processor from 1934 until it was shut down due to bankruptcy in February 1981. An initial site investigation indicated that at least 40% of the 138 tanks that were on-site had inadequate diking. Surface soil samples found total petroleum hydrocarbon contamination up to 165,400 milligrams per kilogram (mg/kg). Excessive runoff and pools of oily water were noted throughout the site during heavy precipitation.

A 1994 CERCLA cleanup addressed hazardous waste and asbestos that was located on-site. Fifty nine tanks, containing approximately 111,300 gallons of petroleum related waste remained on-site after this cleanup action due to the CERCLA petroleum exclusion provision.

After the CERCLA clean-up was completed, the property trustee obtained the services of numerous scrap metal salvagers. Due to these scrapping efforts, tops and sides of tanks have been cut off which has allowed rainwater to collect in the tanks and the petroleum materials to directly discharge onto the ground. Because the site is on a steep hill, run-off from rain events allow these petroleum materials to discharge into a drainage ditch, that runs through wetlands and discharges into Village Creek which discharges into the Neosho River, the source for drinking water for the city of Chanute. Presently, there are 27 tanks remaining on-site containing approximately 80,000 gallons of petroleum related materials.

During the 16 years that the refinery has been closed, the tanks have continued to rust and degrade. No maintenance, corrosion control, leak testing, etc., has been done to maintain the integrity of these tanks. Numerous tanks have no berms around them to serve as secondary containment in the event of any spills or tank failures. There is evidence in the oily water around some of the tanks that do have berms, that the tank contents have leaked out. This has caused extensive soil contamination around and under tanks. Salvagers have further destroyed numerous tanks by cutting off tank tops and leaving product in the bottoms of the tanks, causing the contents to overflow onto the ground. None of the tanks on-site are serviceable due to their deteriorated condition.

Rusting underground and above ground piping is located throughout the site. The majority of these pipes site contain petroleum products. When salvagers worked on the site, improper techniques of cutting pipes which contained flammable petroleum products had resulted in numerous fires and petroleum discharges. Some of these fires crossed the road and burned out wetland vegetation and fields. On several occasions, salvagers set tanks contents on fire to remove the petroleum material in the tanks. Since the refinery is located adjacent to a housing area, the thick black smoke posed a substantial threat to public health and welfare of residents. There is evidence that petroleum contamination has reached ground water.

3.2 Scope of Work for Smith

- 1) Mobilization
- 2) Access Vessels and Piping /Remove Oil and Sludges
- 3) Remove Tanks and Excavate Contaminated Material
- 4) Water Treatment
- 5) Remove Sludge Pit Wastes
- 6) On-Site Treatment
- 7) Restoration

**SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN**

4.0 TASK SAFETY AND HEALTH RISK ANALYSIS

4.1 Task Specific Hazards and Controls

This section is to be addressed in the daily tool box safety meeting as each task is to be attempted. Each Task-Specific Safety Assessment is designed to develop awareness to chemical and physical hazards specific to each task. It would be impractical to repeat in complete detail each control measure and SOP for each job task. Sources and Hazards will be addressed for each job task with reference made to applicable control measures in Sections 4.2, 4.3 and SOP's. The tables in Section 4.2 and 4.3 should be posted in the break area and command post. When the Task-Specific Safety Assessment are discussed additional hazards may need to be addressed.

TASK SPECIFIC SAFETY ASSESSMENT

JOB TASK: Mobilization			
PERSONAL PROTECTIVE EQUIPMENT: Level D			
HAZARD	SOURCES	CONTROL MEASURES	REF.
Topography	Uneven Terrain	Beware of slips/trips and falls	Sec 4.3
Ergonomics	Lifting and bending	Buddy system Proper lifting and bending	Sec 4.3
Wildlife	Insects/Ticks Dogs/Snakes	Beware of and daily inspections Avoid contact	Sec 4.3
Dermatitis	Poison Ivy/Oak	Beware of plant Avoid contact	
Chemical	Tanks Contaminated Areas	Avoid contact	Att C Sec. 4.2
Small Equipment	Chain Saws Weedeaters	Experienced operators Controlled work area	Sec 4.3
Noise	Chain Saw Weedeaters	Wear proper hearing protection	Sec 4.3
Asbestos	Tank Insulation Debris	Asbestos has been removed but beware of remaining debris	Att C Sec. 4.2
Punctures	Metal Objects Sharp Objects	Beware of puncture hazards; wear leather gloves	



SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN

TASK SPECIFIC SAFETY ASSESSMENT

JOB TASK: Access Tanks and Piping/Remove Oil and Sludges			
PERSONAL PROTECTIVE EQUIPMENT: Level D/C (Air Monitoring Dependent)			
HAZARD	SOURCES	CONTROL MEASURES	REF.
Confined Space	Tanks/Pits	Avoid entry Follow H&S procedures	Att. F
Flammable Materials	Tanks/Pipe Contents	Follow H&S procedures Conduct air monitoring	Att. I
Pressurized Materials	Tanks/Pipe	Follow line breaking procedures	Att. N/O
Temperatures Extreme	Summer Temperatures Winter Temperatures	Beware of symptoms Follow H&S procedures	Att. K/L
Heavy Equipment	Back Hoe/Loader	Controlled work area Experienced operators	Att. G
Noise	Back Hoe/Loader Small Equipment	Wear proper hearing protection	Sec. 4.3
Chemical	Tank/Pipe Contents	Avoid Contact	Att. C Sec. 4.2
Dermatitis	Poison Ivy/Oak	Avoid Contact	
Topography	Uneven Surfaces/Debris	Beware of slips, trips/falls Keep work area organized	Sec. 4.3
Ergonomics	Lifting and Bending	Use proper technique Buddy system	Sec. 4.3
Punctures	Sharp Objects	Beware of sharp objects Wear leather gloves	

TASK SPECIFIC SAFETY ASSESSMENT

JOB TASK: Remove Tanks and Excavate Contaminated Material			
PERSONAL PROTECTIVE EQUIPMENT: Level D/C (Air Monitoring Dependent)			
HAZARD	SOURCES	CONTROL MEASURES	REF.
Heavy Equipment	Back Hoe/Loader	Experienced operators Controlled work area	Att. G
Small Equipment	Chain Saws Weedeaters	Experienced operators Controlled work area	Sec. 4.3
Noise	Heavy Equipment Chain Saw/Weedeaters	Wear proper hearing protection	Sec. 4.3
Dermatitis	Poison Ivy/Oak	Beware of plants Avoid contact	
Topography	Uneven Terrain/Debris	Keep area well organized Beware of slips, trips and falls	Sec. 4.3
Wildlife	Insects/Ticks Dogs/Snakes	Beware of and daily inspections Avoid contact	Sec. 4.3
Ergonomics	Lifting and bending	Buddy system Proper lifting and bending	Sec. 4.3
Punctures	Sharp Objects	Beware of sharp objects	Sec. 4.3
Pressurized Material	Tanks/Piping	Follow line breaking procedures	Att. O
Temperature Extremes	Summer Temperatures Winter Temperatures	Follow H&S procedures	Att. K/L
Flammable Materials	Tank/Pipe Contents	Follow H&S procedures Conduct air monitoring	Att. I
Confined Space	Tank/Pits	Avoid entry Follow H&S procedures	Att. F
Hotwork	Tanks and Pipe Cutting	All work approved by Response Manager	Att. P



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TASK SPECIFIC SAFETY ASSESSMENT

JOB TASK: Water Treatment (To Be Completed)			
PERSONAL PROTECTIVE EQUIPMENT:			
HAZARD	SOURCES	CONTROL MEASURES	REF.

TASK SPECIFIC SAFETY ASSESSMENT

JOB TASK: Remove Sludge Pit Wastes (To Be Completed)			
PERSONAL PROTECTIVE EQUIPMENT:			
HAZARD	SOURCES	CONTROL MEASURES	REF.

TASK SPECIFIC SAFETY ASSESSMENT

JOB TASK: On-Site Treatment (To Be Completed)			
PERSONAL PROTECTIVE EQUIPMENT:			
HAZARD	SOURCES	CONTROL MEASURES	REF.

TASK SPECIFIC SAFETY ASSESSMENT

JOB TASK: Restoration			
PERSONAL PROTECTIVE EQUIPMENT: Level D			
HAZARD	SOURCES	CONTROL MEASURES	REF.
Heavy Equipment	Dozer/Loader Back Hoe/BobCat		Att G
Noise	Heavy Equipment Small Equipment	Wear proper hearing protection	Sec. 4.3
Topography	Uneven Terrain Scattered Debris	Beware of slips/trips/falls Keep work area organized	Sec. 4.3
Ergonomics	Lifting and Bending	Use proper lifting and bending techniques	Sec. 4.3
Wildlife	Insects/Ticks Dogs/Snakes	Avoid contact	Sec. 4.3
Dermatitis	Poison Ivy/Oak	Avoid contact	Att. C Sec. 4.2



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4.2 Chemical Hazards

CHEMICAL	TLV/PEL/ IDLH	PHYSICAL CHARACTERISTICS	ODOR THRESHOLD	ROUTES OF EXPOSURE	PPE POLYMERS	SYMPTOMS ACUTE/CHRONIC	FIRST AID
Total Petroleum Hydrocarbons	N/A	Liquid/Sludge	N/A	Inhalation	Nitrile	Dizziness	Fresh Air Flush w/ water
Asbestos	0.1 fiber/cc	Fibrous	N/A	Inhalation	Latex	Chronic Lung	Fresh Air

The above listing should not be taken as a complete assessment of the hazards posed by materials at the Mid-America Refinery Site. The known and unknown mixed chemical hazards at this site prevent a clear determination of the specific effects of discrete compounds. Therefore, personnel must be alert for symptoms of possible exposure such as unusual smells, stinging, burning eyes, nose and throat, skin irritation, as well as feeling extremely well, depressed, sleepy or tired. Symptoms must be immediately reported to the site supervisor.

See Attachment C for Chemical Hazard Information and MSDS'.

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4.3 Physical Hazards

PHYSICAL/ENVIRONMENTAL HAZARD ANALYSIS

HAZARD	PRE PLANNING TO CONTROL HAZARD		ACTIVE CONTROL MEASURES	
Cold Stress	1.	Anticipate possible low temperatures (winter months).	1.	Warm break area
	2.	Remember the temperature does not have to be below freezing to have a cold stress situation.	2.	Warm decaffeinated drinks
			3.	Buddy system/awareness.
			4.	First aid on site.
			5.	Medical care if symptoms persist.
Electrical	1.	Locate and mark existing energized lines.		
	2.	De-energize lines if necessary to perform work safely.		
	3.	All electrical circuits will be grounded.		
	4.	All 120 volt single phase which are not a part of the permanent wiring will have a ground-fault interrupter in place.		
	5.	Temporary wiring will be guarded, buried or isolated by elevation to prevent accidental contact by personnel or equipment.		
	6.	Evaluate potential for high moisture/standing water areas and define special electrical wiring needs-typically requirement for low voltage lighting systems.		
Ergonomic	1.	All operations evaluated for ergonomic impact.	1.	Proper body mechanics techniques stressed and enforced on a daily basis.
	2.	Procedures written to define limits of lifting, pulling, etc.	2.	Mechanical handling equipment maintained and utilized
	3.	Procedures to define how personnel will utilize proper ergonomic concepts and utilize mechanical material handling equipment	3.	Proper body mechanics stressed in scheduled safety meetings
	4.	Necessary mechanical material handling equipment specified and ordered for project.	4.	Injuries reported and medically treated if in doubt about severity
			5.	Operations changed as necessary based on injury experience or potential
Existing Site Topography	1.	Survey site prior to layout. Identify areas unsafe for personnel or equipment due to physical conditions.	1.	Awareness to work environment - regular inspection/audits to identify changing conditions.
	2.	Identify/locate existing utilities.	2.	Shut down operations when unknown conditions encountered.
	3.	Determine impact of site operations on surrounding properties, communities, etc.		
	4.	Identify mechanized equipment routes both on site and onto and off the site.		
	5.	Layout site into exclusion and contamination reduction zones based on initial site evaluation.		
Fires & Explosions	1.	Evaluate all operations for fire and explosion potential.	1.	Inspect fire suppression equipment on a regular basis
	2.	Define specific procedures for unique operations presenting unusual hazard such as flammable tank demolition.	2.	Store flammables away from oxidizers and corrosives.
	3.	Ensure that properly trained personnel and specialized equipment is available	3.	Utilize Hot Work Permit for all hot work on site
	4.	Define requirements for handling and storage of flammable liquids on site, need for hot work permits and procedures to follow in the event of fire or explosion.	4.	Follow any site specific procedures regarding work around flammables.
	5.	Define the type and quantity of fire suppression equipment needed on site.	5.	Review and practice contingency plans.
	6.	Coordinate with local fire fighting agencies to discuss unique fire hazards, hazardous materials, etc.		Discuss on regular basis at scheduled safety
	7.	Ensure site operations comply with 29CFR 1910.157G		
Flammable Vapor and Gases	1.	Evaluate site to determine sources of likely flammable gas or vapor generation.	1.	Calibrated monitoring equipment available and utilized by trained personnel whenever working where flammable gas or vapor is present.
	2.	Develop specific procedures to be followed in the event of exposure to flammables.	2.	Monitoring performed at regular frequency and in all areas where vapor could generate or pool.
	3.	Specify specialized equipment needs for inerting flammable atmospheres, ventilating spaces and monitoring flammable vapor concentrations.	3.	Equipment and operations shut down when threshold levels are exceeded.
	4.	Define requirements for intrinsically safe equipment.		
	5.	Develop contingency plan to follow in the event of fire or		

SMITH TECHNOLOGY CORPORATION SITE SAFETY PLAN

PHYSICAL/ENVIRONMENTAL HAZARD ANALYSIS

HAZARD	PRE PLANNING TO CONTROL HAZARD	ACTIVE CONTROL MEASURES
		4. Contingency plans reviewed regularly by all involved personnel. 5. Work areas are carefully inspected to look for possible ignition sources. Sources are removed. 6. Operations shut down if specific task procedures can't be followed to the letter.
Heavy Equipment Operation	1. Define equipment routes and traffic patterns for site. 2. Insure that operators are properly trained on equipment operation for all equipment required on project. 3. Define safety equipment requirements, including back up alarm and roll over, for all equipment on site. 4. Define equipment routes and traffic patterns for site. 5. Implement SOP of requiring operators to safety inspect equipment on a daily basis in accordance with manufacturer requirements. 6. Evaluate project requirements to ensure that equipment of adequate capacity is specified.	1. Equipment inspected as required. 2. Equipment repaired or taken out of service. 3. Ground spotters are assigned to work with equipment operators. Utilize standard hand signals and communication protocols. 4. Personnel wear the proper PPE, utilize hearing protection, gloves for handling rigging, etc. 5. Equipment safety procedures discussed at daily scheduled safety meetings. 6. Personnel do not exceed lifting capacities, load limits, etc. for equipment in question. 7. Personnel follow basic SOP's which prohibit passengers on equipment, activating brakes and grounding buckets, securing loads prior to movement, etc.
Illumination	1. Evaluate all operations and work areas to determine lighting requirements. 2. Specify specialized lighting requirements including explosion proof, intrinsically safe, lighting needs. 3. Determine if nighttime outdoor operations are necessary. 4. Evaluate tasks to be performed and number of light plants necessary to allow operations. 5. Ascertain if outdoor lighting from nighttime operations will have an impact on surrounding communities.	1. Inspect specialized equipment and discard or replace as needed. 2. Add additional lighting to areas with lighting deficiencies. 3. Inspect drop cords and portable lights on regular basis. Replace or repair as necessary.
Noise	1. Local community noise standards examined. 2. Expected loud operations evaluated to determine compliance with community standards. 3. Loud operations scheduled for approved time periods. 4. Noise level standards established for equipment brought onto site. 5. Hearing protection requirements defined for personnel expected to have excessive exposures.	1. Personnel receive annual audiogram. 2. Personnel required to wear hearing protection. 3. Routine noise level monitoring and dosimetry performed. 4. Defective equipment repaired as needed. 5. Ongoing hearing conservation education promoted at scheduled safety meetings. 6. Medical evaluation following noise (impact) exposure if symptoms present themselves.
Personal Injuries	1. Site operations will be evaluated for exposures with serious injury potential such as falling objects, pinch points, flying objects, falls from elevated surfaces, etc. 2. A written Fall Prevention Program will be developed if workers will be required to work at heights greater than 10 feet from unguarded work locations. 3. PPE requirements will be based on potential for injury.	1. Personnel will wear required PPE. 2. Specialized equipment such as rope grabs, winches, etc. will be inspected prior to each use. 3. Defective equipment will be immediately replaced. 4. All injury and near miss incidents will be reported to the HSO. 5. First aid/CPR trained person on site at all times. 6. All injuries will be treated on site with advanced medical treatment being sought if doubt about severity.
Radiation	1. Evaluate potential for exposure to radioactive materials. 2. If likely, develop specialized training program for personnel. 3. Develop plan and specify equipment for monitoring potential radiation sources.	1. Perform monitoring as defined in safety plan. 2. Perform necessary calibration and maintenance on monitoring equipment. 3. Employees participate in health physics monitoring program.

SMITH TECHNOLOGY CORPORATION SITE SAFETY PLAN

PHYSICAL/ENVIRONMENTAL HAZARD ANALYSIS

HAZARD	PRE PLANNING TO CONTROL HAZARD		ACTIVE CONTROL MEASURES	
	4.	Establish health physics dosimetry program.	4.	Notify Project Manager when suspect materials are detected
	5.	If not likely, implement SOP of stopping work should any sign of radioactive materials become apparent.		
Small Equipment Usage	1.	Site operations evaluated to determine need for specialized intrinsically safe, explosion-proof and UL approved equipment and instruments.	1.	First aid on site
	2.	Implement requirement for G.F.I., double insulated tool usage, or assured grounding program in all outdoor operations, will be utilized.	2.	Transport for medical care if necessary
	3.	Specify equipment needs to ensure that equipment used only for the purpose for which it is designed and to prevent abuse or misuse of the equipment.		
	4.	Specify requirements for the inspections and maintenance of specialized equipment.		
	5.	Specify that all equipment utilized on the project meets all OSHA requirements.		
Wildlife	1.	Inspect work environment where tasks are being performed.	1.	First aid on site.
	2.	Awareness to bites	2.	Seek medical attention if symptoms-signs
	3.	Dogs, animals, poison ivy, etc		
Trenching and Excavation	1.	Implement Smith excavation procedures if entry required into any excavation greater than 4 feet depth.	1.	Competent person in the immediate area at all times that personnel are required to enter trenches.
	2.	Specify that Competent Person(s) assigned to project be present at all times personnel inside trench(s).	2.	Operations shut down if the excavation shows any sign of cave in, excessive water, unacceptable levels of toxic contaminants, changing weather, or shoring systems have visible defects.
	3.	Specify that a Professional Engineer design specialized shoring systems for those that are extremely deep.	3.	Equipment operators keep all personnel inside excavation in sight. No suspended loads or movement of buckets over personnel.
	4.	Specify special PPE and monitoring requirements for excavations in soils contaminated with hazardous materials or gases and vapors.	4.	Regular monitoring is performed in excavations where toxic gases or vapors are possible.
	5.	Ensure excavations comply with 29CFR 1926, Subpart P.		
Weather Conditions	1.	Evaluate prevailing weather conditions for the site.	1.	Employees trained in contingency plan for severe weather conditions.
	2.	Contingency plans developed for likely severe weather conditions such as tornado, and extreme thunderstorm.	2.	Emergency water sources inspected regularly in cold areas.
	3.	Provide for daily weather forecast service in extreme weather areas.	3.	Weather service contacted regularly during storm conditions.
	4.	Plan to weatherize safety systems, such as showers and eye washes, that would be impacted by extreme cold weather.	4.	Supervisory personnel cease operations during extreme storm conditions (i.e., thunderstorms). Personnel evacuate to safe assembly area.
	5.	Order necessary specialized cold weather clothing.		
	6.	Grounding and bonding requirements defined for thunderstorm areas.		
	7.	Sheltered air conditioned break areas provided for extreme hot and cold weather zones.		



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5.0 PERSONNEL TRAINING

5.1 Initial Training

- a. 40 Hour Training
All field employees receive forty hours of classroom training on safe work practices and hazardous waste sites.
- b. Supervisor/Managers
Manager and Supervisors receive eight hours of training on safe management of hazardous waste sites. All training complies with 29CFR 1910.120.

The following individuals are Site Supervisors:

[1] Ron Lybarger

5.2 Site Specific Training

- a. All assigned personnel will receive site specific training on routes of exposure and adverse health effects associated with the chemicals listed on the attachment.
- b. At least one member of each work crew shall have training in the use of portable fire extinguishers in accordance with 29CFR 1910.157G.
- c. IAW 29CFR 1910.120, all personnel newly assigned to hazardous waste work will receive 3 days of on the job training by an experienced supervisor. This typically is achieved by coordinating the work schedule so that they perform 25% of the expected workload the first day; 50% the second day, and 75% the third day.
- d. Each person entering the site shall sign a statement attesting to the fact that they have read and understand the Site Specific Safety Plan. (Attachment Z)

5.3 Annual Refresher

All field employees receive eight hours of refresher training on the above topics within the anniversary date of their initial 40 hour class.

5.4 First Aid/CPR

All field employees receive initial and recertification training. Treatment limited to Good Samaritan/minor first aid. All traumatic/major first aid, and cardiac problems will be referred to medical facilities.

5.5 Subcontractor Requirements

All subcontractors entering the contamination reduction zone and exclusion zone will have adequate training satisfying 29 CFR 1910.120.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The following is a brief description of the personal protective equipment which may be required during various phases of the project. The U.S. EPA terminology for protective equipment will be used: Levels A, B, C and D.

Respiratory protective equipment shall be NIOSH-approved and use shall conform to OSHA 29 CFR Part 1910.134 Requirements. Each employer shall maintain a written respirator program detailing selection, use, cleaning, maintenance and storage of respiratory protective equipment. The written Respirator Program will be maintained at the local and regional offices.

6.1 Level A Protection Shall Be Used When: (NOT ANTICIPATED)

- The extremely hazardous substance requires the highest level of protection for skin, eyes and the respiratory system;
- Substances with a high degree of hazard to the skin are known or suspected;
- Chemical concentrations are known to be above IDLH levels; or,
- Biological hazards requiring Level A are known or suspected.

6.2 Level B Protection Shall Be Used When:

- The substance(s) has been identified and requires a high level of respiratory protection but less skin protection;
- Concentrations of chemicals in the air are IDLH or above the maximum use limit of an APR with full-face mask;
- Oxygen deficient or potentially oxygen deficient atmospheres (<19.5%) are possible; and/or,
- Confined space entry may require Level B.
- Incomplete identification of gases and vapors, but not suspected to be harmful to skin or skin absorbable.

6.2.1 Level B Protective equipment at a Minimum Shall Consist of:

Protective Gear - Level B

Supplied Air
Chemical Resistant/Protective Coveralls (type)
Inner Gloves (type)
Outer Gloves (type)
Outer Work Gloves (type)
Safety Shoes/Boots (type)
Hard Hat
Modifications:

(Check and list required type)

Cascade System/SCBA
Tyvek/Saranex*
Nitrile
Nitrile
Leather **
Chemical Resistant/Steel Toed
X
*Saranex will be used during very wet operations.
**Leather gloves will be used when handling metal and sharp objects.

6.3 Level C Protection Shall Be Used When:

- The same level of skin protection as Level B, but a lower level of respiratory protection is required;
- The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove contaminants; or,
- The substance has adequate warning properties and all criteria for the use of APR respirators has been met.

6.3.1 Level C Protective Equipment at a Minimum Shall Consist of:

Protective Gear - Level C	(Check and list required type)
MSA Air Purifying Respirator or PAPR	Full face
Cartridges (type)	GMC-H
Chemical Resistant/Protective Coveralls (type)	Tyvek/Saranex*
Inner Gloves (type)	Nitrile
Outer Chemical Gloves (type)	Nitrile
Outer Work Gloves (type)	Leather**
Safety Shoes/Boots (type)	Chemical resistant steel toed
Hard Hat	X
Modifications:	*Saranex will be used during very wet operations.
	**Leather gloves will be used when handling metal and other sharp objects.

6.4 Level D Protection Shall Be Used When:

- The atmosphere contains no known hazard; and,
- Work functions preclude splashes, immersion or the potential for unexpected inhalation of, or contact with, hazardous concentrations of harmful chemicals.

6.4.1 Level D Protection Equipment at a Minimum Shall Consist of:

Protective Gear - Level D	(Check and list required type)
Chemical Resistant/Protective Coveralls (type)	Tyvek *
Rain Suit	
Safety Shoes/Boots (type)	Steel Toed
Boot Covers (booties)	As Needed
Work Gloves (type)	Leather*
Hard Hat	X
Face Shield	
Safety Glasses	
Modifications	*When handling drums and/or sludge

Specific operating procedures for PPE and Respiratory Protection are in Attachment D.

6.5 Decisions to Upgrade/Downgrade PPE

- [1] All decisions to downgrade from Level B to C or D must be accompanied by air monitoring results. The Regional Safety Managers must be advised of on-site decisions to downgrade. All decisions must be documented with an Addendum to the Plan.
- [2] The following conditions will necessitate reevaluation of PPE use.
- a. commencement of a new work not previously identified
 - b. change of job tasks during a work phase
 - c. change of season/weather
 - d. contaminants other than those identified in Safety Plan
 - e. change in ambient levels of contaminants
 - f. change in work which affects degree of chemical contact



- a. Pre-employment and periodic update medical examinations are required for persons working at hazardous waste sites.
- b. All physicals must be completed and documented prior to assignment to this site.
- c. All physical exams will be conducted following parameters established by the respective employee's Corporate Physicians.

- a. N/A
- b. N/A
- c. A current Fitness for Duty statement will be kept on site for all Smith personnel.

The medical examination must have been within a 12-month period prior to on-site activity and repeated annually.

- a. Following any accidental or suspected uncontrolled exposure to site contaminants, personnel should be scheduled for a special physical examination.
- b. The physical examination will be specific for the contaminants and the associated target organs or physiological system.
- c. N/A
- d. Questions regarding the type of physical can be directed to Smith's Director of Health and Safety or the Smith Corporate Physician.

All subcontractors entering the contamination reduction or exclusion zone will have adequate medical surveillance satisfying 29CFR 1910.120.10 (f).

- [1] Copy of 40 hour certificate
- [2] Copy of Manager's/Supervisor's 8 hour certificate
- [3] Copy of 8 Hour Annual Refresher (if > 12 months since 40 hour)
- [4] CPR/First Aid Certificate (annual)
- [5] Respirator Fit Test (annual)
- [6] Medical Fitness For Duty
- [7] Memorandum of Understanding & Consent (Smith Drug Program)



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8.0 AIR MONITORING AND ACTION LEVELS

According to 29 CFR 1910.120 (h) Air Monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection needed on-site.

8.1 Routine Air Monitoring Requirements

- Upon initial entry to rule out IDLH conditions;
- When the possibility of an IDLH condition or flammable atmosphere has developed;
- When work begins on a different portion of the site;
- Contaminants other than those previously identified are being handled;
- A different type of operation is initiated;
- Employees are handling leaking drums or containers or working in areas with obvious liquid contamination; and,
- During confined space work.

Air monitoring will consist at a minimum of the criteria listed below. All air monitoring data will be documented and available in the command post site files for review by all interested persons. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications. Calibration and maintenance performed will be entered in the site log and/or instrument log book.

8.2 Site Specific Air Monitoring Requirements

INSTRUMENT	COMPOUNDS TO DETECT	FREQUENCY	COMMENTS/ ACTION LEVEL
Combustible Gas Indicator (CGI)	Explosive/ Flammable Atmospheres	Scan Tanks and Pipes	> 10% LEL
PID/FID	Organic Vapors and Gases	Scan Tanks and Pipes	Unidentified contaminants < Background units - Level D Background-5 units - Level C 5-500 units - Level B
Asbestos/Fiber Monitoring	Asbestos	N/A	> 0.01 fibers/cc for PCM > 70 structures/mm ² for TEM > 1% asbestos/weight bulk sample
Jerome Mercury Analyzer	Mercury Vapors	N/A	> 0.25 mg m ⁻³
Detector Tubes	Various	N/A	
Radiation Meter	Radiation	N/A	> 2 mR/hr
Oxygen Meter	Oxygen	Scan Tanks and Pipes	<19.5% and >23.5% O ₂

* The reading must be sustained for one (1) minute in the breathing zone

8.3 Personnel Monitoring

Explain strategy or why not required: Personal monitoring will be conducted on representative personnel for specific tasks.

8.3.1 Sampling Methods (media type, analyses, NIOSH Method Number, etc.): _____



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8.3.2 Describe calibration procedures: Pre and post sampling.

8.3.3 Analytical laboratory to be used: To be determined.

8.4 Noise Monitoring: ☐ Yes ☒ No

Describe monitoring strategy:

8.5 Heat Stress Monitoring: ☐ Yes ☒ No

Describe monitoring strategy:

Perimeter: ☐ Yes ☒ No

Describe:

8.6 Other: ☐ Yes ☒ No

Describe:

8.7 Name(s) of Monitoring Technician(s): Greg Rakers

8.8 Location of Monitoring Records:

Copies of monitoring records will be retained in the job file upon the completion of the job. Additional copies will be maintained in the Health and Safety Department.

9.0 SITE CONTROL AND STANDARD OPERATING PROCEDURES

9.1 Work Zones

The primary purpose for site controls is to establish the hazardous area perimeter, to reduce migration of contaminants into clean areas and to prevent access or exposure to hazardous materials by unauthorized persons. At the end of each workday, the site should be secured or guarded, to prevent unauthorized entry. Site work zones will include:

9.1.1 Clean Zone/Support Zone

This uncontaminated support zone or clean zone will be the area outside the exclusion and decontamination zones and within the geographic perimeters of the site. This area is used for staging of materials, parking of vehicles, office and laboratory facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the exclusion zone. All personnel arriving in the support zone will upon arrival, report to the command post and sign the site entry/exit log. There will be one controlled entry/exit point from the clean zone to the decontamination zone.

- [1] Location of Clean Zone

9.1.2 Decontamination Zone

The decontamination zone will provide a location for removal of contaminated personal protective equipment and final decontamination of personnel and equipment. All personnel and equipment should exit via the decon area. A separate decontamination area will be established for heavy equipment.

- [1] The decontamination zone is a buffer zone between contaminated and clean areas.
- [2] Identified by yellow banner guard.
- [3] Decon line is located _____ To Be Determined

9.1.3 Exclusion Zone/Hot Zone

The exclusion zone will be the "hot-zone" or contaminated area inside the site perimeter. Entry to and exit from this zone will be made through a designated point and all personnel will be required to sign the hot zone entry/exit log located at the decon area. Appropriate warning signs to identify the exclusion zone should be posted (i.e. "DANGER - AUTHORIZED PERSONNEL ONLY", "PROTECTIVE EQUIPMENT REQUIRED BEYOND THIS POINT", etc.) Exit from the exclusion zone must be accompanied by personnel and equipment decontamination as described in Section 10.0.

- [1] Will be identified by red banner guard.
- [2] These areas will be defined by Red banner guard _____
- [3] General Safety Rules for Exclusion Zone
 - a. wear the appropriate level of PPE defined in plan
 - b. do not remove any PPE or break the integrity to pick, scratch, or touch parts of your body
 - c. no smoking, eating or drinking
 - d. no horseplay
 - e. no matches or lighters in this zone
 - f. implement the communication and line of sight system

9.2 General Field Safety Rules

- All visitors must be sent to the command post.
- It is Smith policy to practice administrative hazard control for all site areas by restricting entrance to exclusion zones to essential personnel and by using operational SOPs.
- Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces. Walk around (not through) puddles and discolored surfaces. Do not kneel on the ground or set equipment on the ground. Stay away from any waste drums unless necessary. Protect equipment from contamination by bagging.
- Eating, drinking, or smoking is permitted only in designated areas in the support zone.
- Hands and face must be thoroughly washed upon leaving the decon area.
- Beards or other facial hair that interferes with respirator fit will preclude admission to the hot zone.
- All equipment must be decontaminated or discarded upon exit from the exclusion zone.
- All personnel exiting the exclusion zone must go through the decontamination procedures described in Section 10.0.
- Safety Equipment described in Section 6.0 will be required for all field personnel.
- Personnel will only travel in vehicles where individual seats (for each occupant are provided. Seat belts will be worn as required.
- Fire extinguishers will be available on site and in all areas with increased fire danger such as the refueling area.
- A minimum of two personnel will always be on site whenever heavy equipment is operated. Only necessary personnel need to be on or around heavy equipment.
- Employees will not interfere with or tamper in any way with air monitoring equipment.
- Backhoes or other equipment with booms shall not be operated within 10 feet of any electrical conductor.
- Visitor log will be maintained at the command post or with the security guard. All personnel coming on site will sign in and out on a daily basis.
- Security will be maintained at the site by closing all gates during normal work hours. Site will be locked up in the evening.
- If unauthorized members of the public are found on site, contact OSC immediately and do not leave the individual unattended.

- Visitors are not allowed in the work areas without authorization. Visitors must sign in at the Command Post and receive authorization to enter the site.
- Buddy System
 - [1] The buddy system is mandatory at anytime that personnel are working in the exclusion zone, remote areas, on tanks, or when conditions present a risk to personnel.
 - [2] A buddy system requires at least two trained/experienced people who work as a team and maintain at a minimum audible and/or visual contact while operating in the exclusion zone.
- Communication Procedures
 - [1] Radios will be used for on site communications and Channel 2 will be the designated channel.
 - [2] The crews should remain in constant radio or visual contact while on site.
 - [3] The site evacuation signal will be 3 blasts on the air or vehicle horn.

10.0 DECONTAMINATION PROCEDURES

In general, everything that enters the exclusion zone at this site, must either be decontaminated or properly discarded upon exit from the exclusion zone. All personnel, including any state and local officials must enter and exit the hot zone through the decon area. Prior to demobilization, contaminated equipment will be decontaminated and inspected before it is moved into the clean zone. Any material that is generated by decontamination procedures will be stored in a designated area in the exclusion zone until disposal arrangements are made.

NOTE: The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for this site is water. Decontamination solution will be changed daily (at a minimum) and collected and stored on-site until disposal arrangements are finalized.

10.1 Procedures for Equipment Decontamination

Following decontamination and prior to exit from the hot zone, the Response Manager shall be responsible for insuring that the item has been sufficiently decontaminated. This inspection shall be included in the site log.

Equipment decontamination will consist of the following steps: Clean with water.

10.2 Procedure for Personnel Decontamination

This decontamination procedure applies to personnel at this site wearing Level B and C protection. These are the minimum acceptable requirements:

Station 1: Equipment Drop

Deposit equipment used on-site (tools, sampling devices and monitoring instruments, radios, etc.) on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

Station 2: Outer Boot and Outer Glove Wash and Rinse

Scrub outer boots, outer gloves and/or splash suit with decontamination solution or detergent water. Rinse off using water.

Station 3: Outer Boot and Glove Removal

Remove outer boots and gloves. If outer boots are disposable, deposit in container with plastic liner. If non-disposable, store in a clean dry place.

Station 4: Outer Garment Removal

If applicable, remove SCBA back-pack and remain on air as long as possible. Remove Chemical Resistant Outer Garments and deposit in container lined with plastic. Decontaminate or dispose of splash suits as necessary.

Station 5: Respiratory Protection Removal

Remove hard-hat, face-piece, and if applicable, deposit SCBA on a clean surface. APR cartridges will be discarded as appropriate. Wash and rinse respirator at least daily. Wipe off and store respiratory gear in a clean, dry location. (See Attachment D)



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Station 6: Inner Glove Removal

Remove inner gloves. Deposit in container for disposal.

Station 7: Field Wash

Thoroughly wash hands and face with soap and water. Shower as soon as possible.

Eating, drinking, chewing gum/tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and/or ingestion of materials is prohibited in any areas where the possibility of contamination exists and is permitted only in the designated break area.

Personnel will not wear or bring dirty/decontaminated clothing into the break areas.

10.3 Emergency decontamination will consist of the following steps:

(Any blood contaminated material will be bag, labeled and accompany the individual to the hospital.)

10.4 The following decontamination equipment is required: Water source on site.

10.5 Disposition of Decontamination Wastes

- [1] All equipment and solvents used for decontamination shall be decontaminated or disposed of with the established waste streams.
- [2] Commercial laundries or cleaning establishments that decontaminate or are used to launder contaminated clothing shall be informed of the presence and potentially harmful effects of the contaminants.
- [3] N/A

11.0 HAZARD COMMUNICATION PROGRAM

Each contractor will be responsible for maintaining a copy of their Hazardous Communication Program and MSDS' on site. The following items are specific to this job site:

11.1 Material Safety Data Sheets

- [1] Material Safety Data Sheets will be maintained at the Command Post in the Health and Safety Binder.
- [2] MSDS' will be available to all employees for review during the work shift.
- [3] See Attachment C and/or the Smith Health and Safety Binder.

11.2 Container Labeling

- [1] All containers received on site will be inspected by the contractor using the material to ensure the following:
 - a. all containers clearly labeled
 - b. appropriate hazard warning
 - c. name and address of the manufacturer

11.3 The following chemicals were brought to the site:

- [1] Alconox
- [2] Gasoline
- [3] Diesel Fuel
- [4] _____
- [5] _____

11.4 Employee Training and Information

- [1] Prior to starting work, each employee will attend a health and safety orientation and will receive information and training on the following:
- an overview of the requirements contained in the Hazardous Communication Standard
 - Hazardous chemicals present at the site
 - the location and availability of the written Haz Com Program
 - physical and health effects of the hazardous chemicals
 - methods of preventing or eliminating exposure
 - emergency procedures to follow if exposed
 - how to read labels and review MSDS' to obtain information
 - location of MSDS file and location of hazardous chemical list

See Smith Health and Safety Binder for Hazard Communication Program and applicable MSDS'.

12.0 EMERGENCIES/ACCIDENTS/INJURIES

It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate.

12.1 Emergency Contacts for the Mid-America Refinery Site

SERVICE	CITY/LOCATION	EMERGENCY PHONE
Fire	Chanute, KS	911
Police	Chanute, KS	911
Sheriff	Neosho County, KS	911
Ambulance	Chanute, KS	911
*Hospital	Neosho Memorial Regional Medical Center	316/431-4000
Address	629 South Plummer Avenue	
	Chanute, KS 66720	
Poison Control Center		800/332-6633

*Directions from Site to Hospital: From the site, turn left on Santa Fe and go one block. Turn left onto Ashgrove Road and go one mile. Turn left onto Plummer Avenue and go 1.5 miles. Hospital is on the right. **(SEE MAP IN ATTACHMENT B):**

Map will be updated in on site vehicles by each individual site.

NOTE: Maps and directions to the hospital will be posted in the office and decon trailers.



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The route to the hospital was verified by: Greg Rakers on 01/28/98. Distance from site to hospital is 2.5 miles. Approximate driving time is 5 minutes.

The following individuals have been trained in CPR and First Aid:

Ron Lybarger

12.2 Additional Emergency Numbers

National Response Center	800-424-8802
Center for Disease Control	404-488-4100 (24 hr)
AT&F (Explosives Information)	800-424-9555
Chemtrec	800-424-9300

Smith Technology Corporation Contacts

Smith Technology Corporation	800-334-0004 (24 Hr.)
Smith Technology Corporation (St. Louis)	314-532-7660

12.3 Emergency Equipment Available On-Site

COMMUNICATIONS EQUIPMENT		LOCATION
Public Telephones		
Private Telephones		
Mobile Telephones		
Two-Way Radios		
Emergency Alarms/Horns		
Other:		

MEDICAL EQUIPMENT		LOCATION
First Aid Kits		
Inspection Date:		
Inspected By:		
Stretcher/Backboard		
Eye Wash Station: (within 100 feet of hazard zone)		
Safety Shower		



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FIRE FIGHTING EQUIPMENT		LOCATION
Fire Extinguishers		
Inspection Date:		
Inspected By		
Other		

SPILL OR LEAK EQUIPMENT		LOCATION
Absorbent Boom/Pads:		
Dry Absorbent:		

ADDITIONAL EMERGENCY EQUIPMENT		LOCATION

12.4 Accident Reporting/Investigations

- 12.4.1 All injuries or accidents must be reported to the Response Manager or Site Safety Officer immediately.
- 12.4.2 The Response Manager will contact Smith Health/Safety by telephone immediately. The District Health/Safety Manager will conduct an immediate investigation of the accident and document all results on the Supervisor's Accident Investigation Report and State Worker's Compensation Form.
- 12.4.3 The Response Manager will complete the First Report of Injury and FAX a copy to Smith Health/Safety immediately.
- 12.4.4 The Response Manager will assign a supervisory individual to accompany all injured personnel to the clinic and follow guidelines outlined in the Smith Return to Work Program.
- 12.4.5 Copies of all Supervisor's Accident Reports will be sent to the Smith Corporate Director of Health and Safety.

13.0 EMERGENCY RESPONSE CONTINGENCY PLAN**13.1 Project Personnel Responsibilities During Emergencies****RESPONSE MANAGER (RM)**

As the administrator of the project, the RM has primary responsibility for responding to and correcting emergency situations. The RM will:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, total evacuation and securing of the site or up-grading or down- grading the level of protective clothing and respiratory protection.
- Take appropriate measures to protect the public and the environment including isolating and securing the site, preventing run-off to surface waters and ending or controlling the emergency to the extent possible.
- Ensure that appropriate Federal, State and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted.
- Ensure that appropriate decon treatment or testing for exposed or injured personnel is obtained.
- Determine the cause of the incident and make recommendations to prevent the recurrence.
- Ensure that all required reports have been prepared.

13.2 Medical Emergencies:

Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket.) First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to Corporate Health and Safety.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and information on the chemical(s) they may have been exposed to. This information is included in Table 2.3. Any vehicle used to transport contaminated personnel, will be cleaned or decontaminated as necessary.

13.3 Fire or Explosion:

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival the RM or designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on- site.

If it is safe to do so, site personnel may:



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- Use fire fighting equipment available on site.
- Remove or isolate flammable or other hazardous materials which may contribute to the fire.

13.4 Spills, Leaks or Releases:

In the event of a spill or a leak, site personnel will:

- Locate the source of the spillage and stop the flow if it can be done safely.
- Begin containment and recovery of the spilled materials.

13.5 Evacuation Routes and Resources:

Evacuation routes have been established by work area locations for this site. All buildings and outside work areas have been provided with two designated exit points. Evacuation should be conducted immediately, without regard for equipment under conditions of extreme emergency. See site map for evacuation routes.

- Evacuation notification will be three blasts on an air horn, vehicle horn, or by verbal communication via radio.
- Keep upwind of smoke, vapors or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation is not via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave it near the exclusion zone or in a safe place.
- The RM will conduct a head count to insure all personnel have been evacuated safely.
- In the event that emergency site evacuation is necessary, all personnel are to:
 1. Escape the emergency situation;
 2. Decontaminate to the maximum extent practical; and,
 3. Meet at the command post.
- In the event that the command post is no longer in a safe zone, meet: Site entrance at gate.

14.0 **CONFINED SPACE**

A confined space is defined as a space or work area not designed or intended for normal human occupancy, having limited means of access and poor natural ventilation, and or any structure, including buildings or rooms which have limited means of egress. Examples include tanks, vats, and basements. Confined spaces identified at this site are listed below. If a confined space entry is conducted, it will be done in accordance with procedures presented in Attachment E.

Type of Confined Space Location On-Site Comments

Tanks	Various Tanks On-Site
Pits	Various Pits On-Site



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**ATTACHMENT A
SITE SAFETY PLAN AMENDMENTS**



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SITE SAFETY PLAN AMENDMENT	
Amendment No.:	
Site Name:	
Date of Issue:	
Type of Amendment:	
Reason for Amendment:	
Alternate Safeguard Procedures:	
Required Changes in PPE:	

Smith Response Manager (Date)

Smith Safety Manager (Date)

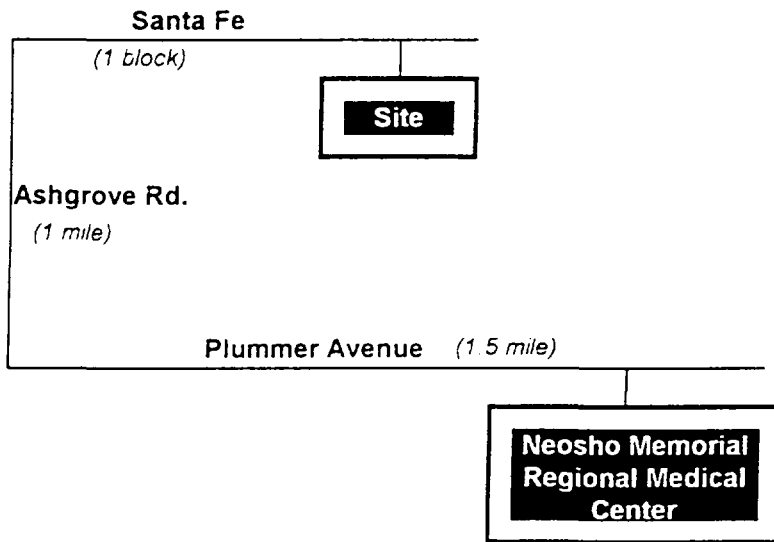


SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN

ATTACHMENT B

SITE MAPS

DIRECTIONS TO HOSPITAL



**Neosho Memorial Regional
Medical Center**
629 South Plummer Ave.
Chanute, KS 66720

316/431-4000

FROM SITE:

TURN LEFT ONTO SANTA FE GO ONE (1) BLOCK TO ASHGROVE ROAD.
TURN LEFT GO ONE (1) MILE TO PLUMMER AVENUE,
TURN LEFT TAKE PLUMMER (1.5 MILES) TO HOSPITAL,
HOSPITAL IS ON THE RIGHT.



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**ATTACHMENT C
CHEMICAL HAZARD INFORMATION**

catalyst, ion implanta-

...ic; white arsenic; ar-
oxide; arsenous anhy-
As₂O₃.

... tasteless powder,
... soluble in acids and
... d 3.865. Sublimes

... er and lead concen-
... yrite or galena con-
... ds As₂O₃ vapor. Con-
... of varying purity called
... e). A higher-purity
... obtained by resub-
... 99+ % pure).

... gen, a poison.
... mels, aniline colors,
... insecticide, rodenti-
... cattle dip, hide preser-
... e, preparation of other

... sulfide: arsenic
... sulfide; arsenic tersul-
... 9. As₂S₃.

... or powder, changes
... 3, mp 300C, insoluble
... acid, dissolves in alka-
... d nitric acid.
... e as the mineral orpi-
... from arsenious acid
... hydrogen sulfide.

... nt, single crystals.
... it, pyrotechnics, glass
... niconductors, hair re-

CAS: 7784-42-1.

... p -113.5C, bp -62C,
... ble in water, slightly solu-

... minium arsenide with
... d, electrochemical re-
... pounds in acid solutions.
... pure or in mixture with

... ion. TLV 0.05 ppm.
... military poison, doping
... lectronic components.

... il for syphilis originally
... at no longer in use. It
... senic and benzene.

... ration grade of methyl

artificial cinnabar. See mercuric sulfide, red.

artificial snow. A copolymer of butyl and isobutyl methacrylate, often dispersed from an aerosol bomb or other atomizing device, used in decorative window displays, etc. Man-made snow is crystallized water vapor made by mechanical means.

"Arubren CP."⁴⁷⁰ TM for a highly chlorinated aliphatic hydrocarbon compound used in rubber compounds to decrease flammability of vulcanizates.

arylalkyl. A compound containing both ali-
phatic and aromatic structures, e.g., alkyl ben-
zenesulfonate. Also called aralkyl.

aryl. A compound whose molecules have the
ring structure characteristic of benzene, naph-
thalene, phenanthrene, anthracene, etc. i.e., ei-
ther the six-carbon ring of benzene or the con-
densed six-carbon rings of the other aromatic
derivatives. For example, an aryl group may be
phenyl C₆H₅ or naphthyl C₁₀H₇. Such groups
are often represented in formulas by "R."
See also alkyl.

As. Symbol for arsenic.

as-. Abbreviation for asymmetrical, same as uns-.

ASA. Abbreviation for acrylic ester-modified
styrene acrylonitrile terpolymer.
See also "Luran sulfur."

asarone. See 2,4,5-trimethoxy-1-propenylben-
zene.

asbestine. A soft fibrous magnesium silicate.
Used as a filler in paper, rubber, and plastics.

asbestos. CAS: 1332-21-4. A group of impure
magnesium silicate minerals which occur in fib-
rous form. Colors: white, gray, green, brown.
D 2.5. Noncombustible.

(1) Serpentine asbestos is the mineral chrysotile, a magnesium silicate. The fibers are strong and flexible so that spinning is possible with the longer fibers. A microcrystalline form, TM "Avibest," has been developed.

(2) Amphibole asbestos includes various sili-
cates of magnesium, iron, calcium and sodium.
The fibers are generally brittle and cannot be
spun, but are more resistant to chemicals and
to heat than serpentine asbestos.

(3) Amosite.

(4) Crocidolite.

Occurrence: Vermont, Arizona, California, North
Carolina, Africa, Italy, Yukon, Quebec, Mexico.
Hazard: A carcinogen. Highly toxic by inhalation
of dust particles. TLV (amosite) 0.5 fibers/cc
more than 5 microns long; (chrysotile) 2 fibers/
cc more than 5 microns long; (crocidolite) 0.2
fibers/cc more than 5 microns long; (other
forms) 2 fibers/cc more than 5 microns long.
Use: Fireproof fabrics, brake lining, gaskets, roof-
ing compositions, electrical and heat insulations,
paint filler, chemical filters, reinforcing agent in
rubber and plastics, component of paper dryer
felts, diaphragm cells, cement reinforcement.
Note: A promising substitute for asbestos for ce-
ment reinforcement is glass fiber made from slate
and limestone.

ascaridole. 1,4-peroxido-p-menthene-2).

C₁₀H₁₆O₂

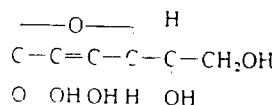
Properties: A liquid, naturally occurring peroxide,
bp 84C (5 mm), d 1.011 (13/15C), refr index
1.443 (20C)

Derivation: By vacuum distillation of chenopo-
dium oil

Hazard: Strong oxidizing agent, explodes on heat-
ing to 130C or in contact with organic acids.
Use: Initiator in polymerization, medicine.

ascorbic acid. (l-ascorbic acid; vitamin C).

CAS: 5081-7. C₆H₈O₆.



A dietary factor which must be present in the
diet of man to prevent scurvy. It cures scurvy
and increases resistance to infection. Ascorbic
acid presumably acts as an oxidation-reduction
catalyst in the cell. It is readily oxidized; citrus
juices should not be exposed to air for more than
a few minutes before use.

Properties: White crystals (plates or needles), mp
192C, soluble in water, slightly soluble in alcohol,
insoluble in ether, chloroform, benzene, petro-
leum ether, oils and fats, stable to air when dry.

Sources: Food source: acerola (West Indian
cherry); citrus fruits; tomatoes; potatoes; green,
leafy vegetables. Commercial sources: Synthetic
product made by fermentation of sorbitol.

Units: One international unit is equivalent to 0.05
milligram of l-ascorbic acid. Grade: USP, FCC.

Use: Nutrition, color fixing, flavoring and preser-
vative in meats and other foods, oxidant in bread
doughs, abscission of citrus fruit in harvesting,
reducing agent in analytical chemistry. The iron,
calcium and sodium salts are available for bio-
chemical research.

ascor
tiss
enc
Use:

ascorl
low
Mp
veg
Deri
Grad
Use
ma

-ase.
ent
etc
it.

ash.

ma
It
oxi
req
con
to
It
and
and
ash.
See a

askare
elect
wher
only
ie.
larly
zene
oxid.
diph
and
Use: J
fluid
See al

ASM.
Meta

asparag

l-aspara
CAS:
treatn
by b
yeasts
units/

coating (raw fruits and vegetables), and defoaming agent (beet sugar, yeast). The liquid form (white mineral oil) is used as a laxative, textile lubricant, and dispersing agent. There are three grades of both solid and liquid types with various specifications (USP, NF, and FCC).
See also ointment.

petrolatum wax. A microcrystalline wax containing hydrocarbons from $C_{33}H_{70}$ to $C_{43}H_{88}$. Solidifying range 71–83°C.
See also wax, microcrystalline.

"Petrolene."TM TM for a petroleum solvent prepared by straight-run distillation.
Properties: Water-white, initial bp 140–145°F, 95% distills between 195–200°F, d 0.701 (15.5°C), flash p (TCC) –15°F (–26.6°C), mild, nonresidual odor.
Hazard: Highly flammable, dangerous fire risk.
Use: Rubber cements, sealers, fast-drying lacquers, lacquer dopes, roto inks used on high-speed presses.

petroleum. (crude oil). A highly complex mixture of paraffinic, cycloparaffinic (naphthenic), and aromatic hydrocarbons, containing a low percentage of sulfur and trace amounts of nitrogen and oxygen compounds. Said to have originated from both plant and animal sources 10–20 million years ago. The most important petroleum fractions, obtained by cracking or distillation, are various hydrocarbon gases (butane, ethane, propane), naphtha of several grades, gasoline, kerosene, fuel oils, gas oil, lubricating oils, paraffin wax, and asphalt. From the hydrocarbon gases, ethylene, butylene, and propylene are obtained, these are important industrial intermediates, being the source of alcohols, ethylene glycols and monomers for a wide range of plastics, elastomers, and pharmaceuticals. Benzene, phenol, toluene, and xylene can be made from petroleum, and hundreds of other products, including biosynthetically produced proteins, are petroleum-derived. About 5% of the petroleum consumed in the US is used as feedstocks by the chemical industries.

Occurrence: At present half of the world's proven resources are in the Middle East and North Africa, the other half being divided among the US (including Alaska), Canada, Venezuela, USSR, the North Sea area, Indonesia, Mexico, Rumania, and Australia.

Properties: Viscous, dark-brown liquid, unpleasant odor, d 0.78–0.97, flash p 20–90°F.

Hazard: Flammable, moderate fire risk. Toxic by ingestion, local skin irritant.

For further information refer to American Petroleum Institute, 1271 Avenue of the Americas, NY, NY.

See also natural gas, petrochemical. See Appendix E 4 for history of the industry.

petroleum benzin. A special grade of ligroin.

petroleum coke. See coke.

petroleum ether. This term is used synonymously with petroleum naphtha. It is also sometimes used as a synonym for ligroin or petroleum spirits. It is technically a misnomer for it is not an ether in the chemical sense. For details about specified distillation ranges and other distinctive properties, consult ASTM and API specifications.

See naphtha (1).

petroleum gas, liquefied. See liquefied petroleum gas.

petroleum jelly. See petrolatum.

petroleum naphtha. See naphtha (1).

petroleum spirits. In Great Britain the term "petroleum spirits" refers to a volatile hydrocarbon mixture having a flash p 32°F (0°C).

Hazard: Highly flammable, dangerous fire risk.
See naphtha (1a). See also spirits, petroleum; ether.

petroleum, synthetic. See pyrolysis.

petroleum thinner. See naphtha (1a).

petroleum wax. A high molecular weight solid hydrocarbon derived from petroleum. There are three types: paraffin waxes, microcrystalline waxes, and petrolatum waxes. All are made mostly by solvent dewaxing, although pressing and sweating processes are still used.
See specific entry.

"Petronates."TM TM for salts of petroleum sulfonic acids, varying in molecular weight and color.

Use: Emulsifying agents, dispersing agents, wetting agents, corrosion-preventive.

"Petrosul."TM TM for a series of highly purified natural petroleum sulfonate products available in high, medium, and low molecular weight ranges. Useful in applications requiring the surface active functions of foaming, detergency, emulsibility, dispersion, solubilization, spreading, and rust protection.

"Petrotect."TM TM for a series of rust-preventive and hydraulic fluids in general meeting military specifications. The rust preventives are classified as solvent cut backs, petrolatum barriers, general purpose preservatives, and engine preservative lubricants. Hydraulic fluids include both preservative and operational types.



**SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN**

**ATTACHMENT D
PERSONAL PROTECTIVE EQUIPMENT
AND
RESPIRATORY PROTECTION SOP'S**

INSPECTION OF PERSONAL PROTECTIVE CLOTHING

- [1] Determine that clothing material is correct for specified task
 - a. compatibility chart
 - b. chemical hazard chart in Safety Plan
 - c. MSDS
- [2] Visually inspect material for:
 - a. imperfect seams
 - b. non-uniform coatings
 - c. tears
 - d. discoloration/degradation
 - e. malfunctioning closures
- [3] Hold up to light and check for pinholes.
- [4] Flex material:
 - a. observe for cracks
 - b. other signs of shelf deterioration
- [5] If the material has been used previously, inspect inside and out for signs of chemical penetration/degradation
 - a. discoloration
 - b. swelling
 - c. stiffness
- [6] During the work task:
 - a. evidence of discoloration/degradation
 - b. closure failure
 - c. tears
 - d. punctures
 - e. seam discontinuities

RESPIRATORY PROTECTION**General Guidelines**

- [1] All personnel required to use respirators will select and use the respirators based upon guidelines established by OSHA, NIOSH, and the Smith Respiratory Protection Program.
- [2] All individuals required to wear respirators will have received a documented pre-issue qualitative fit test for the MSA full-face.
- [3] Each individual will be responsible for conducting a positive/negative fit check each time the respirator is donned.
- [4] Each individual shall be responsible for cleaning his/her own respirator at least once daily and is permitted to leave the work area to wash his/her own respirator as needed.
- [5] Cartridges or filters shall be changed after each daily use or whenever an increase in breathing resistance/odor is detected, or if they become wet. All changes will be made in uncontaminated areas.
- [6] No Smith employee shall wear a respirator until he/she has been examined by a physician and determined to be physically able to wear respiratory protection. This examination shall be documented at the site.
- [7] All personnel must be qualitatively fit test every six months.

Air Purifying Respirator Inspection and Checkout

- [1] Visually inspect the entire unit for any obvious damages, defects, or deteriorated rubber.
- [2] Make sure the facepiece harness is not damaged.
- [3] Inspect lens for damage and proper seal in facepiece.
- [4] Exhalation Valve
Pull off plastic cover and check valve for debris, tears, or deformities in the neoprene valve.
- [5] Inhalation Valve
Screw off cartridges/canister and visually inspect neoprene valves for tears. Make sure than inhalation valves and cartridge receptacle gaskets are in place.
- [6] Insure that the speaking diaphragm retainer ring is hand tight.

- [7] Make sure than you have the correct cartridge.
- [8] Don and perform positive and negative pressure check.

Storage of Air Purifying Respirators

- [1] OSHA requires that respirators be stored to protect against:
 - * Dust
 - * Sunlight
 - * Heat
 - * Extreme Cold
 - * Excessive Moisture
 - * Damaging Chemicals
 - * Mechanical Damage
- [2] Respirators must be stored in a clean area which is not likely to be contaminated by the work in progress.
- [3] Respirators should not be hung from their headbands for prolonged periods of time.

SCBA Inspection and Checkout

- [1] Monthly Inspection
 - a. check cylinder label for current hydrostatic test date
 - b. inspect cylinder for large dent or gouges
 - c. inspect cylinder gauge for damage
 - d. complete routine inspection
 - e. fill out inspection documentation card
- [2] Routine Inspection
 - a. Pre-Operational
 - * high-pressure hose connector is tight on cylinder fitting
 - * by-pass valve is closed
 - * mainline valve is closed
 - * regulator outlet is not covered or obstructed
 - b. Backpack and Harness Assembly
 - * inspect backpack/harness straps for wear, damage, secure
 - * check wear and function of belts
 - * check backplate and cylinder holder for damage
 - c. Cylinder and High Pressure Hose Assembly
 - * check cylinder to insure firmly attached to backplate
 - * open cylinder valve; listen or feel for leakage around packing and hose connection
 - * check high pressure hose for damage or leaks

d. Regulator

- * cover regulator outlet with palm of hand
- * open mainline valve
- * remove hand from regulator outlet
- * open by-pass valve slowly to assure proper function
- * close by-pass valve
- * open mainline valve
- * note pressure reading on regulator gauge
- * close cylinder valve while keeping hand over regulator outlet
- * slowly remove hand from outlet and allow air to flow
- * note pressure when low pressure warning alarm sounds; it should be 550-650 psi
- * close mainline valve
- * check regulator for leaks by blowing air into regulator for 5-10 seconds
- * draw air from outlet for 5-10 seconds
- * if a positive pressure or vacuum cannot be maintained, there is a leak.

e. Facepiece & Corrugated Breathing Hose

- * inspect head harness and facepiece for damage, serrations, and deteriorated rubber
- * inspect lens for damage and proper seal in facepiece
- * inspect exhalation valve for damage and dirt buildup
- * stretch breathing hose and carefully inspect for holes and deterioration
- * inspect connector for damage and presence of washer
- * perform negative pressure test with facepiece donned

f. Storage

- * refill cylinder to 2216 psi
- * close cylinder valve
- * tightly connect high pressure hose to cylinder
- * bleed pressure from high pressure hose by opening mainline valve
- * close by-pass valve
- * close mainline valve
- * fully extend all straps
- * store facepiece in a clean plastic bag for protection



**SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN**

ATTACHMENT E

**ALCOHOL AND DRUG PROCEDURES
(Smith only)**

ALCOHOL AND DRUG POLICY
(Smith only)

- [1] No personnel are to report to the site under the influence of drugs or alcohol.
- [2] Failure to comply will result in being barred or removed from the site and/or other disciplinary action.
- [3] All Smith employees will receive, and pass, a drug screen prior to work beginning.
- [4] A drug screen will be required of any personnel involved in an accident requiring medical attention.
 - a. The Response Manager is responsible for assuring that they have a copy of all Smith employee's signed consent forms.
 - b. The supervisor will accompany the injured worker to the clinic for medical treatment and collection of the drug urinalysis.
- [5] Response Manager will insure that they have Drug and Alcohol Kits on site.



SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN

ATTACHMENT G
HEAVY EQUIPMENT OPERATIONS

SMITH ENVIRONMENTAL TECHNOLOGIES CORPORATION

SAFETY AND HEALTH PROGRAM

(SMTH67) HEAVY EQUIPMENT OPERATIONS

1.0 PURPOSE

This procedure describes minimum safety requirements for heavy equipment operations at Smith Environmental Technologies Corporation (Smith Environmental) work locations.

2.0 SCOPE

The requirements of this procedure apply to Smith Environmental associates and subcontractors involved in heavy equipment operations including, but not limited to; bulldozers, compactors, graders, scrapers, backhoes, excavators, quarry dumps, dump trucks, and cranes.

3.0 DEFINITIONS

Roll Over Protection: Structurally designed bars, cages, or framework over the equipment cab that protect the operator from being crushed when a piece of heavy equipment rolls over.

Swing Radius: The area within reach of a rotating cab, counterweight and operating attachments of a piece of heavy equipment. This includes the area within the reach of attachments such as the boom on a crane or the arm on an excavator, when the attachment is fully extended. It also includes the area within reach of a swinging load on a crane or hoist; and the area within reach of the back end of a heavy equipment cab when it moves from side to side.

Clearance: The amount of open space required between heavy equipment and safety hazards such as electrical power lines.

Suspended Loads: Materials lifted above the ground by a crane, hoist, excavator bucket or bulldozer blade.

RESPONSIBILITIES

3.1 Regional/District Safety and Health Staff

Regional/district safety and health staff are responsible for contacting state OSHA agencies to obtain copies of state-specific heavy equipment regulations, training and licensing requirements. Safety and health staff will coordinate training for equipment operators and

assure that appropriate training certificates are placed in the corporate training files. Safety and health staff will assist site supervisors in enforcing safe work practices and training requirements for heavy equipment operations.

3.2 Site Supervisors

Site supervisors are responsible for verifying that equipment operators have the required training and experience to perform their assigned work tasks. This may be done by reviewing training certificates, licenses and/or observing hands-on exercises with heavy equipment. Site supervisors will inspect heavy equipment operations for unsafe work practices and immediately correct unsafe situations. Inspections will be documented in writing at least monthly.

Site supervisors are responsible for establishing a routine maintenance schedule for each piece of equipment and assuring that maintenance is completed on time. Site supervisors will also arrange for required repairs and major servicing and verify that such repairs and service have been properly completed before the equipment is returned to work operations.

3.3 Equipment Operators/Truck Drivers

Heavy equipment operators and truck drivers are prohibited from running such equipment without authorization from the site supervisor. Operators and drivers will demonstrate adequate training and experience with each piece of equipment to the site supervisor before receiving authorization to begin work.

Equipment operators and truck drivers will perform pre-startup equipment checks prior to running any heavy equipment. These must include verifying the safe operating condition of at least the following devices:

- Lights,
- Horn,
- Brakes,
- Steering,
- Tires or tracks,
- Turn signals,
- Gauges,
- Hydraulic systems, if applicable,
- Backup alarms,
- Windows and windshield wipers,
- Windshield defrosters,
- Seat belts,
- Seat adjustments,
- Guards covering moving parts and pinch points, and
- Operating controls for booms, buckets and other applicable attachments.

A heavy equipment inspection checklist is attached.

Equipment operators and truck drivers will check and refill (if necessary) the fuel, oil and coolant levels in each unit at the beginning of their work shift, prior to job task startup. Equipment operators and truck drivers will also clean the windows of each cab to assure clear visibility. Broken or excessively scratched windows will be reported to the site supervisor for repair or replacement.

Damaged or defective heavy equipment must be immediately tagged out-of-service until such problems are corrected.

Equipment operators and truck drivers will maintain equipment cabs in a clean and orderly condition. Tools, trash and other debris must be removed or properly secured to prevent their falling under the driver's feet during operation. To prevent littering, trash will not be transported in the back of open trucks unless it is placed in a closed container.

Equipment operators and truck drivers will remove trash and personal belongings from equipment at the end of each work shift.

Equipment operators and truck drivers are responsible for either refueling or contacting on-site supervision to obtain refueling for heavy equipment, before turning over the units to another associate.

Equipment operators and drivers are responsible for identifying safety hazards such as power lines and buildings that are present within the travel path or swing radius of their equipment. Equipment operators and truck drivers will position and operate their equipment with the required clearance to prevent contact with such hazards.

3.4 All Associates

Smith Environmental associates are responsible for complying with this procedure and with state OSHA regulations for heavy equipment. Associates are prohibited from horseplay around heavy equipment and from running such equipment without authorization from the site supervisor.

Associates are also prohibited from removing fire extinguishers, guards covering moving parts or pinch points, or other safety equipment.

4.0 MINIMUM SAFETY EQUIPMENT REQUIRED

4.1 Seat Belts

All heavy equipment will be equipped with seat belts. Seat belts will be worn at all times when operating or riding in heavy equipment. Riders are prohibited on heavy equipment unless a seat and seat belt are provided for their use.

4.2 Backup Alarms

All heavy equipment with greater than 1.5 ton capacity must be equipped with backup alarms.

4.3 Fire Extinguishers

All heavy equipment will be equipped with an ABC-type portable fire extinguisher in the equipment cab.

4.4 Rollover Protection

Heavy equipment cabs must be equipped with rollover protection before working on Smith Environmental projects.

4.5 Lifting/Load Capacities

Heavy equipment must be marked with the maximum rated lifting or load capacity. Such markings may be present on lifting attachments or in the equipment cabs. Associates are prohibited from removing lifting and load rating signs.

4.6 Spotters

Spotters will be provided where high ambient noise levels or poor visibility interfere with a an equipment operator's or truck driver's ability to see objects on all sides of the equipment. High-visibility traffic vests will be worn by spotters and personnel working on the ground near heavy equipment traffic areas.

4.7 Personnel Protective Equipment

A hard hat, safety glasses with side shields, long pants, shirt with sleeves, and steel-toe safety shoes or boots with six inch high tops are the minimum protective clothing required for heavy equipment operations. Site safety and health plans will specify additional chemical-resistant clothing and respirators required for specific work tasks.

Hearing protection will also be worn for work operations where noise levels have not been measured and where noise levels are known to exceed 85 dBA (decibels). Ground personnel within 10 feet of heavy equipment operations are required to wear hearing protection as well as the equipment operators. (Ten feet is approximately five adult strides.)

5.0 OPERATING SAFETY REQUIREMENTS

5.1 Mounting and Dismounting Equipment

Personnel will use three-point contact when mounting or dismounting from heavy equipment. This requires continuously facing the equipment and keeping either two hands and one foot, or one hand and two feet, in contact with the equipment at all times. Jumping out of cabs or off other surfaces of heavy equipment is prohibited.

Equipment operators and truck drivers will remain properly seated while running heavy equipment, unless the equipment is specifically designed for the operator to stand.

5.2 Traffic Flow

Heavy equipment has a much greater stopping distance than passenger vehicles and pedestrians. For this reason, heavy equipment will have the primary right of way on field work sites. Traffic patterns will be established to prevent or minimize pedestrian crossings and passenger vehicle traffic in heavy equipment work areas.

Smith Environmental facilities and work sites will have a maximum speed limit of 15 miles per hour, unless otherwise designated by the client, property owner or contractual agreements.

Heavy equipment will be shut off, with the parking brake set and attachments lowered to the ground when units are parked or left unattended. Engines may be left running if required to operate the loading or unloading equipment or if the equipment operator is dismounting temporarily to examine his work area.

5.3 Ground Personnel and Spotters

Ground personnel and spotters will stand clear of the travel path and swing radius of heavy equipment, and avoid becoming boxed in between equipment and buildings or other structures. Personnel will stand clear of end-dump trucks when the bed is up.

Personnel will remain in a position where they are clearly visible to the driver or operator and will obtain eye contact and an all clear signal from the operator before approaching the cab or entering the travel path or swing radius of the equipment. Ground personnel and spotters are also prohibited from standing or walking under suspended loads or lifted blades or buckets on heavy equipment.

Spotters and ground personnel will wear high-visibility traffic vests.

Spotters and equipment operators will discuss and agree on hand signals to be used during heavy equipment operations at each work site. These signals must be standardized and communicated to all affected personnel before work operations begin.

Hand signals will be reviewed periodically during daily tailgate safety meetings to avoid confusion and accidents.

5.4 Repairs and Major Servicing

Equipment repairs and major servicing will be performed by properly qualified personnel only. Smith Environmental associates will not perform repairs or major servicing on rented equipment without written authorization from the rental company. Guards covering moving parts and pinch points must be replaced before returning the equipment to work operations.

Written records of repairs and major service will be maintained for each piece of heavy equipment at each Smith Environmental work location.

5.5 Fuel Storage

Temporary fuel storage tanks at field work sites will be labelled with flammable hazard warnings. Tanks will be protected with traffic barriers and placed away from the path of moving vehicles and equipment. Ignition sources are prohibited within 75 feet of fuel storage tanks.

5.6 Overhead Power Lines

All overhead power lines and other overhead hazards must be identified in advance. If possible, overhead power lines must be de-energized, grounded, and locked out to prevent re-energizing while heavy equipment is working nearby. Contact the local utility or property owner responsible for each power line to request shutdown before drill rig setup begins.

Where de-energizing power lines is impractical, the heavy equipment and booms, towers or other raised attachments must maintain the following minimum clearances from overhead power lines to prevent arcing and electrical shock.

Power line Voltage	Minimum Clearance for Operating Heavy Equipment
50,000 volts or less	10 feet
Greater than 50,000 volts	10 feet plus 0.4 inches for each additional 1,000 volts in the power line

In transit with buckets, booms and other attachments lowered, heavy equipment must maintain the following minimum safety clearances from overhead power lines.

Power line Voltage	Minimum Clearance for Heavy Equipment in Transit
50,000 volts or less	4 feet
50,000 volts to 345,000 volts	10 feet
345,000 volts to 750,000 volts	16 feet
750,000 volts to 1,000,000 volts	20 feet

A signalman or spotter is required when moving or positioning heavy equipment near overhead power lines.

5.7 Buried Utilities

All underground utilities must be located before ground-breaking work with heavy equipment begins. This includes fiberoptic cables, water, natural gas, electrical, sewer, and process lines. Local utilities will be contacted to request location and marking of their lines. The property owner will be contacted or ground-penetrating radar or other equipment will be used to locate buried utilities on the client's property.

Locations of buried utilities must be clearly marked with signal flags or paint before drilling begins. Initial ground-breaking may be done with heavy equipment. When work approaches the suspected depth of buried utility lines, hand shoveling or probing with glass or wooden stakes will be used to identify the exact location of utilities. Lines will be exposed by hand shoveling and protected against damage and breakage before heavy equipment operations continue.

SMITH ENVIRONMENTAL TECHNOLOGIES CORPORATION

HEAVY EQUIPMENT INSPECTION CHECK LIST

Date of Inspection: _____

Equipment Name and Identification Number: _____

Inspected by: _____

Circle OK if equipment condition is acceptable. Explain any equipment damage or defects, and what action was taken to correct them.

Fire extinguisher	OK	_____
Back up alarm	OK	_____
Load/lifting capacity marked	OK	_____
Lights and signals	OK	_____
Horn	OK	_____
Brakes	OK	_____
Steering	OK	_____
Seat belts	OK	_____
Tire pressure and wear	OK	_____
Tracks clean	OK	_____
Windows clean	OK	_____
Windshield wipers	OK	_____
Fluid levels full	OK	_____
Battery charged	OK	_____
Engine belts	OK	_____
Gauges	OK	_____
Guards on moving parts	OK	_____
Steps and hand grips clean	OK	_____



**SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN**

**ATTACHMENT J
USE OF HIGH PRESSURE WATER CLEANUP**

SMITH ENVIRONMENTAL TECHNOLOGIES CORPORATION

SAFETY AND HEALTH PROGRAM

(SMTH60) TANK CLEANING AND PRESSURE WASHING

1.0 PURPOSE

This procedure describes minimum requirements for safely cleaning and pressure washing liquid and sludge storage tanks. Procedures listed in this document are consistent with those contained in National Fire Protection Association documents: NFPA 327 (Cleaning or Safeguarding Small Tanks and containers); and NFPA 306 (Cleaning or Inerting & Safe For Hotwork).

2.0 SCOPE

This procedure applies to Smith Environmental Technologies Corporation (Smith Environmental) associates and subcontractors cleaning or pressure washing tanks. This procedure will be used in conjunction with Smith Environmental procedures for SMTH53 Confined Space Entry and SMTH55 Lockout/Tagout (Control of Hazardous Energy).

3.0 DEFINITIONS

Atmosphere: Generic term for gases, vapors, and or mists occupying the space above the liquid or sludge inside a tank.

Atmosphere Testing/Air Monitoring: Testing for flammable vapors and oxygen content using a combustible gas/oxygen indicator (CGI). Toxic gases or vapors can be monitored with an instrument such as a photoionization detector (PID), flame ionization detector(FID), or gas detector tubes.

Cold Cutting: A method of opening tanks or piping without using open flames and without generating sparks or heat.

Inerting: Replacing the oxygen inside a tank with an inert gas such as nitrogen that will not support fires and explosions.

Ventilating/Purging: Forcing clean air into a tank to move flammable and toxic vapors out. This is done with equipment such as large fans or ventilation blowers.

IDLH: Immediately Dangerous to Life and Health. In the event of respirator failure, the concentration that is likely to cause death, or immediate or delayed permanent adverse health effects, or prevent escape from such an environment. Severe eye irritation and breathing difficulty are examples of such symptoms. IDLH concentrations are determined by the National Institute for Occupational Safety and Health (NIOSH) to aid in respirator selection.

Flammability Limits: The range of vapor concentrations between the lower explosive limit (LEL) and the upper explosive limit (UEL) where fire or explosion can occur if a source of ignition is presented.

Flammable Liquid: A liquid with a flash point below 100° F (37.8° C). Flammable liquids may also be referred to as Class I.

Combustible Liquid: OSHA defines combustible liquids as those with a flash point at or above 100° F (37.8° C). Combustible liquids may also be referred to as Class II or Class III.

Fire Suppression Foams: According to the NFPA Fire Protection Handbook, fire suppression foam is an air-water emulsion used to cover the surface of flammable liquid. Foam is used to contain vapors and exclude oxygen.

Explosion-Proof: Equipment that is enclosed in a case that can contain internal explosions and will prevent sparks or other ignition sources from igniting flammable or combustible vapors. Explosion-proof equipment must also have a case that remains cool enough on the outside to prevent ignition of flammable and combustible vapors.

Intrinsically Safe: Equipment that is incapable of generating ignition sources or sufficient heat or energy to ignite flammable or combustible vapors under any conditions. The only equipment that is currently rated as intrinsically safe is certain brands and models of air monitoring equipment.

Oxygen Deficiency: Less than 19.5 percent oxygen by volume in the tank atmosphere.

Oxygen Rich: Greater than 23.5 percent oxygen by volume in the tank atmosphere.

4.0 RESPONSIBILITIES

4.1 Regional/District Safety and Health Staff

Regional/district safety and health staff are responsible for contacting local fire departments and air pollution control authorities before tank cleaning to determine the requirements for regulatory inspectors and air pollution permits for tank ventilation. Safety and health staff will include these requirements in site safety and health plans.

Safety and health staff will identify the potential chemical and physical hazards associated with each tank prior to cleaning. A description of these hazards, their potential health effect, and required control measures will be included in site safety and health plans.

Safety and health staff will inspect tank cleaning procedures periodically to verify compliance with regulatory requirements and safe work practices. The site safety officer will perform air monitoring for tank cleaning operations.

4.2 Site Supervisors

Site supervisors are responsible for implementing site safety and health plans and safe work practices for tank cleaning. Site supervisors will verify that required air monitoring and ventilation are performed before tanks and associated piping are cleaned. Site supervisors will also verify that tank cleaning personnel have current training in confined space entry and rescue, and safe use of pressure washing and ventilation equipment.

4.3 All Associates

Associates are responsible for complying with site safety and health plans and safe work practices for tank cleaning. Associates are prohibited from cutting or cleaning tanks and associated piping without required air monitoring and ventilation. Associates are prohibited from performing any of the following actions.

- Entering IDLH atmospheres.
- Entering oxygen deficient atmospheres.
- Entering tanks that have been inerted.
- Entering tanks with flammable vapor concentrations greater than 10 percent LEL.
- Welding, cutting or brazing on tanks.
- Cutting or opening tanks with welding equipment or other heated or open flame sources.
- Steam cleaning tanks that have stored flammable or combustible materials.

5.0 EQUIPMENT REQUIRED

The following equipment and supplies may be required for tank cleaning operations.

- Intrinsically safe combustible gas meter or multi-gas meter (capable of reading LEL, hydrogen sulfide and percent oxygen) and calibration gases.
- Intrinsically safe photoionization or flame ionization detector with calibration gases.
- Crushed dry ice, or nitrogen gas cylinders with regulators and enough tubing to deliver gas to the bottom of the tank.

- Gas cylinder wrenches.
- Pipe wrenches and saws.
- Electric, manual or air powered drill.
- Water or cutting oil for cooling during cutting operations.
- Leather gloves.
- Duct tape/rags to seal tank openings.
- Supplied-air respirators.
- Chemical-resistant clothing appropriate for tank contents.
- Drip pans or other containers to catch leaks from open valves and cut piping.
- Polyethylene to wrap cut sections of pipe.
- Minimum of two 20-pound ABC-type fire extinguisher(s).
- Locks, blocking devices, bonding and grounding clamps and cables, and other lockout equipment.
- Emergency rescue tripod and winch.
- Five-point fall protection harnesses and fall protection lanyards.
- Intrinsically safety portable lighting and flashlights.
- 3000 psi Pressure washers and cleaning solutions.
- Material Safety Data Sheets for cleaning solutions used on-site.
- Hearing protection, hard hats and face shields.
- Explosion-proof ventilation blower and duct work.

6.0 POTENTIAL HAZARDS

6.1 Flammable and Explosive Vapors

Tanks which have been used to store or transport flammable or combustible liquids may contain explosive vapor concentrations. Explosive conditions exist when the concentration of vapors is between the LEL and UEL and adequate oxygen is present.

The atmosphere inside a tank may be oxygen deficient and vapor rich. When the tank is ventilated, enough oxygen may enter to create a flammable or explosive mixture. Flammable atmosphere conditions in tanks may change rapidly due to temperature, pressure, or air flow variations.

6.2 Flammable Sludges

Sludges present in tanks can be flammable solids. These materials may be ignited by a cutting torch, or other ignition source, even when the vapor concentration above the sludge is less than the LEL.

6.3 Static Electricity

Static electricity can be generated by ventilation or lighting equipment used in tank cleaning. Static electricity can also be generated by steam cleaning equipment and by discharging carbon dioxide gas inside tanks. Static charges can ignite flammable liquids, solids and vapors.

All ventilation devices, duct work, and lighting equipment used during tank cleaning must be rated as explosion-proof. Air monitoring equipment used inside tanks must be rated as intrinsically safe.

In addition, ventilation blowers, duct work, pumps, and pressure washing equipment used in tank cleaning must be bonded to the tank and properly grounded to prevent electrical faults and buildup of static electricity. Smith Environmental Safety and Health Program SMTH56 must be followed to assure correct bonding and grounding.

6.4 Dry Ice

Dry ice is used for inerting tanks. Inerting may be required for tank cleaning. Skin contact with dry ice can cause frostbite and severe tissue damage. Personnel will wear a minimum of heavy cloth or leather work gloves when handling dry ice.

6.5 Oxygen Rich Atmospheres

Oxygen gas is highly explosive. Oxygen rich atmospheres may be present in tanks that have been used to store strong oxidizing liquids such as a 37 percent solution of hydrogen peroxide.

6.6 Oxygen Deficiency

Dry ice and nitrogen gas are used to create an inert atmosphere inside tanks. This controls the flammability hazard, but creates an oxygen deficient atmosphere that is immediately fatal to personnel without supplied-air respirators.

6.7 Hydrogen Sulfide

Tanks that have been used to store crude oil, mercaptans or other sulfur-containing compounds may contain lethal concentrations of hydrogen sulfide gas. Hydrogen sulfide gas has no odor at elevated concentrations. It is capable of rapidly paralyzing the automatic breathing reflex in humans. Hydrogen sulfide is also flammable. Tanks suspected of containing sulfur compounds or hydrogen sulfide will be monitored for hydrogen sulfide concentrations with direct-reading instruments. The CGI may be a multi-gas instrument equipped with a hydrogen sulfide sensor.

6.8 Toxic Vapors and IDLH Conditions

Direct-reading hydrocarbon detectors such as flame ionization detectors (FIDs) or photoionization detectors (PIDs) will be used to monitor tank atmosphere for total vapors and gases prior to tank entry or cleaning. Workers are prohibited from entering IDLH atmospheres. Workers are also prohibited from entering toxic vapor or gas atmospheres that are above allowable occupational exposure limits, unless they are equipped with supplied air breathing apparatus, chemical-resistant clothing and emergency retrieval harnesses and lanyards.

6.9 Contaminant Intrusion

Associated piping and valves must be drained, de-energized and locked out and tagged out prior to beginning tank cleaning. These devices are capable of refilling tanks with liquids, sludges, or vapors that can cause fires, explosions, spills, or releases.

6.10 Electrical Power and Moving Parts

Electrical power sources must be shut off, de-energized, locked out and tagged to prevent fires and electric shock. Any moving parts inside the tank such as mixing devices must be shut off, blocked from movement, and locked out before tank cleaning begins. These devices are also potential spark, fire and physical injury hazards.

6.11 Permit-Required Confined Spaces

Tanks are permit-required confined spaces. Personnel are prohibited from entering tanks without compliance with Smith Environmental Safety and Health Program SMTH53 for confined space entry. This requires specific training, air monitoring, respirators, protective clothing, and emergency rescue equipment.

7.0 CGI AND HYDROCARBON DETECTOR CALIBRATION

CGIs will be field calibrated at the beginning of each work shift. Calibrations will be performed with nitrogen gas or other "zero air" standard, with a flammable gas standard such as methane or hexane, and with a hydrogen sulfide calibration standard. Calibrations will be documented in writing with copies to the project files.

CGIs that fail field calibrations will be immediately repaired or replaced.

Oxygen, hydrogen sulfide, and flammable vapor sensors in CGIs will be replaced every six months, as a minimum. Sensors will be marked with the date they are installed in the instrument.

Hydrocarbon detectors will be field calibrated at the beginning of each work shift in accordance with the manufacturer's user manual and instructions. When used to monitor for unknowns or mixtures of chemicals such as petroleum fuels, FIDs are generally calibrated with methane; PIDs with isobutylene.

CGIs and hydrocarbon detectors can only give approximate air concentrations for the gases other than the ones used for calibration. When a tank contains a single, known chemical, instrument calibration will be performed with calibration standards for that specific chemical, if possible. This will allow the use of instrument readings as true air concentrations for that specific chemical. Calibration gases can be obtained from instrument manufacturers and suppliers.

Calibrations will be documented in writing with copies to the project file. Instruments failing this field calibration check will be immediately repaired or replaced.

PIDs will be equipped with 11.7 electron volt (eV) lamps. Lamps and filters will be cleaned and replaced in accordance with the manufacturer's recommendations.

8.0 OPERATIONAL PROCEDURES

The contents and previous use of each tank must be identified before cleaning operations begin. This may require sampling the tank contents for lab analysis.

Tanks will be inspected for evidence of leaks and structural damage before cleaning and before placing personnel or equipment on top of the tank.

All ignition sources must be removed from the area of a tank cleaning operation for a distance of at least 75 feet around the operation. Smoking is prohibited during tank cleaning activities. Tank cleaning will stop during storms and lightning.

8.1 Removal of Tank Contents

Pumpable liquids and sludges will be removed from tanks and associated piping before cleaning operations. Attached pipelines should be drained back into the tank, if possible, before cleaning.

Pumps used to handle flammable and combustible substances must be rated as explosion-proof. Pumps, hoses, and vacuum trucks used to remove tank contents must be bonded to the tank and grounded to prevent buildup of static electricity.

Polyvinyl chloride (PVC) piping is prohibited for removal of tank contents because it is especially prone to buildup of static electricity.

If a vacuum truck is used to collect the tank contents, the truck will be located upwind from the tank. Vacuum pump exhaust gases will be discharged downwind of the truck and tank area and away from potential ignition sources and exposed personnel.

8.2 Lockout/Tagout of Process Equipment

Supply lines, utilities, power sources and moving parts will be shut off, drained or de-energized, blocked, locked out and tagged prior to beginning tank cleaning. Smith Environmental Safety and Health Program SMTH55 will be followed to assure control of these hazardous energy sources.

8.3 Initial Air Monitoring

Initial opening of tanks will be done with non-sparking tools. Personnel opening the tank will stand upwind of the opening if possible and will wear PPE and respirators to prevent exposure to the tank contents. Personnel are prohibited from placing their heads inside tank openings without supplied-air respirators while performing air monitoring.

All tanks will be tested for oxygen deficiency and flammable vapors. Extension tubing will be used to sample all levels of the tank and around visible flanges or other equipment where vapor pockets may occur. Oxygen testing will be performed before flammable testing, since CGIs cannot accurately measure flammable vapors in an oxygen deficient atmosphere.

Tanks used to store leaded gasoline will require a lead filter for the CGI. Leaded gasoline vapors will foul the CGI sensors and cause incorrect readings. Lead filters can be purchased from the CGI manufacturer or instrument supplier.

Hydrocarbon detectors will be used to monitor the total gas and vapor concentrations at all levels of the tank. Levels of protection and respirators required for personnel entry into tanks will be based, in part, on the results of initial air monitoring. Specific clothing and respirators and action levels for upgrading and downgrading will be specified in the site safety and health plan.

CGIs will be allowed to run for several minutes in clean air to clear the instrument of vapors after each sampling attempt.

If the tank atmosphere is oxygen deficient, is oxygen rich, contains greater than 10 % LEL or is above the UEL, fans or mechanical blowers will be used to ventilate the tank and associated piping before cleaning.

8.4 Inerting

It may be necessary to cut openings in a tank to allow personnel or equipment access for cleaning. Tanks that are oxygen rich or contain any measurable concentration of flammable vapors, based on CGI readings, must be inerted prior to cutting.

Inerting is performed with crushed dry ice or nitrogen gas. Crushed dry ice is scattered on the tank bottom to displace vapors that are heavier than air. All tank openings except the vent pipe are sealed and the dry ice is allowed to evaporate to fill the tank with carbon dioxide. Evaporation may take several hours depending on the tank size and air temperature.

Carbon dioxide gas is prohibited for inerting tanks because it builds up static electricity when discharged. Carbon dioxide gas is cold when released from a gas cylinder. It creates condensation on the inside of the fill pipe and tank when released. This increases generation of static electricity.

Fire extinguishers are also prohibited for inerting tanks. This equipment is too small to adequately inert tanks and full extinguishers must be available for fire protection.

Nitrogen gas is more effective for inerting tanks with internal flanges, mixing devices or attached piping. If nitrogen gas is used for inerting, the gas cylinder should be bonded to the tank and grounded. The preferred nitrogen inerting method is to feed the gas into the tank bottom through a hose inserted in the fill hole or fill pipe. All tank openings except the fill pipe and vent pipe must be closed. The tank should not be pressurized to more than 5 psi, to prevent ruptures.

Liquid nitrogen is prohibited for tank inerting because it must be supercooled to become liquid. Such "cryogenic" liquids can cause severe burns and permanent damage from skin or eye contact. Direct contact immediately freezes the surrounding area and can cause frostbite.

A CGI must be used to verify the effectiveness of inerting before any cutting operations begin. Oxygen levels inside the tank must be less than 8 percent by volume and no flammable vapors must be detected. Periodic monitoring will be performed during cutting operations to warn workers if the inert atmosphere is lost.

The inert atmosphere must be maintained during cutting to prevent fires and explosions. This may require adding more dry ice or nitrogen gas.

8.5 Cold Cutting

Cold cutting methods will be used to disconnect piping from tanks. Cold cutting methods will also be used to disconnect tanks from their mounting brackets or pads, if necessary. Tanks and associated piping must be purged of flammable vapors or inerted before any cutting activities are performed.

Cuts should be started by drilling one or more pilot holes. A mechanical saw or shears can then be used to enlarge the opening and complete the cut. Water or cooling oil will be used to cool the cutting surface and the area of the cut to prevent heat generation and ignition sources. Two ABC type fire extinguishers must be present in the immediate area of cutting operations. Personnel must wear PPE and respirators while cutting to prevent exposure to inert atmospheres and hazardous chemicals in the tank.

8.6 Purging and Ventilation

Smith Environmental associates will perform tank cleaning operations from outside the tank whenever possible. If tank entry is required to complete cleaning, the tank must be purged with clean air and continuously ventilated during personnel entry, to assure adequate oxygen and control flammable or toxic vapors inside the tank.

Ventilation blowers and duct work used to purge and ventilate tanks must be explosion-proof and must be bonded to the tank and grounded to prevent buildup of static electricity.

The preferred method of purging and ventilating a tank is to attach the ventilation blower to the tank fill pipe or drop tube. Where the fill pipe is not available, a manway or other access hatch can be used to introduce ventilation hoses, provided that the hoses do not block emergency escape when personnel are inside the tank.

Ventilation blower manufacturers and suppliers can provide special flattened ducts to minimize the space occupied by vent hoses when they must be inserted into manways. These devices allow free personnel access to the manway while the ventilation hose is in place.

Clean air must be introduced as low into the tank as possible to move product vapors heavier than air out of the tank. To avoid tank rupture, air pressure in the tank must remain below 5 psi. Air flow into the tank will be adjusted, depending on the size of the vent opening, to maintain air pressure below this level.

Exhaust vapors from purging and ventilation must be released to prevent exposure, preferably at least 12-feet above ground level and three feet above the roof line of nearby structures. A CGI and hydrocarbon detector will be used to monitor the work area periodically while purging and ventilating to verify that flammable or toxic vapors are not collecting at ground level.

Purging and ventilation will continue during tank cleaning and personnel entry. Air flow will only control the tank atmosphere as long as it continues. Until the tank has been cleaned, stopping the air flow for any length of time can allow hazardous atmospheres to regenerate inside the tank.

8.7 Periodic Air Monitoring

The CGI and hydrocarbon detector will be used to verify the effectiveness of purging and ventilation. Tank atmosphere must measure 19.5 to 23 percent oxygen and less than 10 percent LEL prior to cleaning or personnel entry.

Continuous air monitoring will be performed inside the tank during personnel entries. This monitoring may be performed with multi-gas CGIs and hydrocarbon detectors that are equipped with audible alarms and flashing lights or displays to warn workers if hazardous conditions occur.

9.0 PRESSURE WASHING

High pressure water sprays with or without detergent, may be used to clean tanks. A Material Safety Data Sheet must be present on-site for any detergent or other cleaning solutions used. The following safe work practices will be used during pressure washing.

9.1 Authorized Personnel Only

Associates are prohibited from using pressure washing equipment without prior training in its operation, maintenance and safe work practices. Repairs and maintenance will only be performed by properly trained maintenance staff or manufacturer's representatives.

9.2 Inspections, Repairs and Maintenance

Pressure washing equipment will be inspected for damage and defects before each use. Users will verify that hoses and water supplies are properly attached and that fittings are tight. Damaged or defective equipment will be repaired or replaced immediately and will not be used until it is functioning properly.

9.3 Pressure Washer Safety Devices

Pressure washing wands and nozzles must be equipped with automatic safety shut-offs that will stop the discharge if the operator drops the wand or releases the trigger.

In addition, where hot water is used, hot surfaces on the pressure washer must be guarded to prevent skin contact and burns.

9.4 Injury Prevention and Protective Equipment

Whenever possible, tanks will be cleaned from outside. If personnel entry is necessary, such entries must be performed as permit-required confined space entry in accordance with Smith Environmental Safety and Health Program SMTH53.



Pressure washers typically operate at 3000 psi or greater. These units are capable of removing paint from buildings and equipment. They can cause serious eye injuries and cuts, or amputate fingers or toes if aimed at human beings. Personnel are prohibited from aiming or discharging pressure washers at humans or animals. Horseplay is prohibited during pressure washing.

Where aboveground tanks and piping are pressure washed, splash shields may be required to prevent over spray and protect nearby people and structures. Aboveground pressure washing activities will be separated from personnel, vehicle and heavy equipment travel paths in designated decontamination zones.

Workers using pressure washers must wear either full-face respirators or splash goggles with side shields and a full face shield, to prevent eye injuries. Heavy gloves and waterproof boots or shoe covers with slip-resistant soles will also be required. Hand protection is required to prevent contact with both hazardous chemicals and with hot water and hot surfaces on the pressure washer. Specific PPE and respirators will be listed in site safety and health plans for each project.

Pressure washing inside tanks creates excessive noise levels. Personnel inside tanks during pressure washing will wear hearing protection with noise reduction ratings high enough to prevent hearing damage from these noise levels.

Only the pressure washing wand, nozzle and attached hoses will be placed inside a tank. The main pressure washing unit will remain outside the tank. Pressure washing units must be grounded to the tank and bonded.

9.5 Waste Disposal

Washing and rinsing solutions must be pumped out of the tank periodically during cleaning. Continuous pumping is desirable to avoid slips and falls and to prevent cleaning personnel from standing in contaminated water inside the tank. All washing and rinsing solutions and debris will be containerized for treatment, recycling or disposal as contaminated waste unless laboratory analysis demonstrates that alternative waste disposal methods are legal.



**SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN**

**ATTACHMENT K
HEAT STRESS**

**SMITH ENVIRONMENTAL TECHNOLOGIES CORPORATION
SAFETY AND HEALTH PROGRAM
(SMTH34) HEAT STRESS**

1.0 PURPOSE

Heat-related illness is a common occupational hazard in physically demanding work activities associated with hot weather and the use of impermeable, chemical-resistant clothing. This procedure describes minimum requirements for preventing occupational injury and illness due to heat stress in Smith Environmental Technologies Corporation (Smith Environmental) work operations.

2.0 SCOPE

This procedure applies to work activities performed by Smith Environmental associates in temperatures greater than 70°F (21°C) with or without the use of impermeable, chemical-resistant clothing.

3.0 HEAT STRESS CONDITIONS

Environmental factors - temperature, radiant heat (such as from the sun) and air velocity - affect the amount of stress a worker experiences in a hot work area. Also important to the level of stress a worker faces are personal factors such as age, weight, fitness, medical condition and acclimatization.

The body reacts to high external temperature by circulating blood to the skin for release of heat. This is evidenced by increased pulse rate and dilation of peripheral blood vessels. However, if muscles are being used for labor, less blood is available to flow to the skin and release heat.

Sweating is another means the body uses to maintain a stable internal body temperature. However, sweating is only effective if the humidity level is low enough to permit evaporation, if the lost fluids and salts are replaced and if permeable clothing is worn.

If the body cannot release excess heat via the coping mechanisms listed above, it will store it. When this happens the body's core temperature rises. As the body continues to store heat, the individual is at increased risk for heat stress disorders.

4.0 HEAT STRESS DISORDERS

4.1 Heat Rash

Heat rash, also called prickly heat, is caused by continuous exposure to heat and/or humidity. Profuse sweating while wearing impermeable clothing causes moisture to remain on the skin. This results in plugging of the sweat glands resulting in retention of sweat and inflammation. Signs and symptoms of heat rash include many tiny raised red blisters on affected areas with pricking sensations during heat exposure. Heat rash is usually mild and transitory in nature.

The condition can be discouraged by resting in a cool area during break times to allow the skin to dry. Also taking frequent showers provides relief.

4.2 Heat Cramps

Heat cramps are caused by depletion of body electrolytes during sweating. If lost fluid is replaced only with water, body electrolyte levels are diluted. This results in painful cramping of the large muscle groups such as the arms, legs and abdomen, during or after work hours.

Cramps may be relieved or prevented by replacing lost fluids with fortified drinks such as Gatorade and eating a well balanced diet with foods containing sodium and potassium. The use of cooling devices reduces sweating and the need for fluid replacement.

4.3 Heat Exhaustion

Heat exhaustion, or heat fatigue, occurs with sustained work in hot environments when the worker is not acclimatized and does not replace lost fluids. Dehydration and pooling of blood in the periphery causes decreased circulating blood volume to vital organs, particularly the brain and heart. The worker experiences fatigue, headache, nausea, moist and clammy skin, rapid heart rate, slightly elevated body temperature and fainting. While the condition is not life-threatening, if the worker faints while performing hazardous work, the injury could be serious.

4.4 Heat Stroke

Heat stroke is a life-threatening heat stress disorder resulting from the body's inability to regulate its core body temperature. Heat stroke occurs with sustained exertion in hot environments, usually coupled with several other predisposing factors mentioned above. The worker stops sweating and hot dry skin, which may be reddish, mottled or bluish. The worker will also have elevated body temperature (in excess of 104 degrees Fahrenheit), mental confusion, loss of consciousness, seizures and/or coma. The worker will die unless treated promptly.

Call 911 (or other appropriate emergency phone number) immediately for help. Rapid cooling is essential while awaiting the arrival of medical help. Remove the worker to a cool, shaded area and immerse the worker in cool water using a tub, hose or wetted material such as towels. Vigorously fan the worker to promote cooling. Prompt first aid can prevent permanent injury to the brain and other vital organs.

5.0 RESPONSIBILITIES

5.1 Project Supervisors

- Manage field operations to reduce heat stress and prevent heat strain.
- Ensure that work schedules allow for work acclimatization and appropriate work/rest regimens.
- Provide adequate drinking water, electrolyte replacement fluids, and break areas.
- Provide appropriate personnel protective equipment for protection against thermal stresses.
- Verify that at least two individuals are trained in First Aid/CPR.

5.2 Site Safety and Health Officers (SHO)

- Notify project supervision when heat stress prevention measures should be implemented.
- Review heat stress prevention and treatment at a daily tailgate safety meetings for job sites where heat stress may exist.
- Ensure that contractor employees are given this information.
- Ensure at least two associates on each shift are trained in first aid and CPR.
- Document vital signs of all personnel that enter the exclusion zone wearing PPE. The vital signs shall be taken before entry and directly after exiting the exclusion zone. All vital signs shall be taken by the SHO or assigned person.
- Monitor and document the ambient temperature in the work zone as needed.
- Document notable physical appearance observations of personnel.

5.3 All Associates

- Follow heat stress prevention procedures (See Sec. 6.0).
- Be alert to self and coworkers' signs of heat stress.
- Immediately notify the site supervisor or the site safety officer of any worker who appears to be injured or ill.
- Ensure that all vital sign data is documented.

6.0 PREVENTION AND TREATMENT

6.1 Prevention

Preventative measures for heat stress will be implemented when the ambient air temperature is greater than 70 degrees Fahrenheit in the work zone. Preventative measures will reduce the risk of serious injury and loss of work productivity.

All Smith field associates receive pre-employment and periodic medical examinations that include an evaluation of their ability to work under thermal stresses while wearing respirators and personal protective equipment.

Associates will use the buddy system, always working in pairs or with at least one other associate within their line of sight at all times.

New associates or those unaccustomed to working under thermal stresses will be allowed to become acclimatized. During the first seven (7) days of work in a hot environment, their work load is modified to begin at approximately 50 % of the expected work load, and is increased gradually each day. Associates can lose acclimatization in a few days. Therefore, those who have been away from the hot environment for more than four (4) days are allowed to re-acclimatize themselves as if they were new associates. The individual workloads will be based on the site safety officer's recommendations.

Associates are permitted to take rest breaks as needed during high heat conditions when the associate feels affected by the heat in conjunction with SHO recommendations. However, all associates working under potential thermal stress conditions will take at least one 15-minute rest break every two hours, as a minimum. Work/rest cycles will be established on a site-specific basis in conjunction with health and safety management for projects requiring respirators, chemical-resistant coveralls, physically strenuous work activities, and/or potential exposure to radiant heat. Work/rest cycles will vary throughout the duration of the project based on site conditions and vital sign monitoring. Work periods may have to be decreased and rest periods increased during times of high heat stress.

Cool shaded break areas will be provided. Under extreme heat stress conditions, consideration will be given to working in the cooler times of the day or at night.

Associates are required to increase their fluid intake when working under heat stress conditions. Cool water and/or electrolyte replacement beverages are provided in designated lunch and/or break areas.

Vehicles and heavy-equipment cabs are air-conditioned wherever possible.

Mechanization of work tasks is used to reduce the need for manual labor, wherever possible.

The use of cooling devices such as ice vests and cool deluge showers may be implemented on a site-specific basis.

Workers will self-monitor for signs and symptoms of heat stress. Additional monitoring for body temperature, peripheral pulse, respiratory rate, blood pressure and/or body weight will be considered under special circumstances.

6.2 Vital Signs

When vital signs are monitored, the following guidelines will be in place:

1. Workers will not re-enter the exclusion zone in impermeable PPE when oral body temperature exceeds 100.6°F.
2. If oral body temperature exceeds 99.6°F, the next work period will be shortened by one-third (1/3).
3. Workers will not re-enter the exclusion zone in impermeable PPE when heart rate (pulse) exceeds 110 beats per minute.
4. Workers may re-enter the exclusion zone once vital signs normalize.

6.3 First Aid

Associates experiencing symptoms of heat exhaustion such as headache, nausea, vomiting, or muscle cramps will immediately decontaminate, remove chemical-resistant clothing and respirators and move to a shaded break area. Associates should sit or lie down. On-site first aid personnel will be summoned to evaluate ill associates. If fully conscious, the associate will be encouraged to drink cool water and the associate's head, neck, and clothing may be moistened with water to increase evaporative cooling. Ill associates may also be placed in an air-conditioned vehicle to facilitate cooling.

Medical personnel and emergency transport will be summoned immediately for any associate experiencing symptoms of heat stroke. The associate's respirator and chemical-resistant clothing will be removed immediately. The associate's clothing may be moistened with cool water to increase evaporative cooling. Fanning the associate and placing him/her in an air-conditioned vehicle will also facilitate cooling. Heat stroke is an immediate life-threatening condition. The ill associate will be transported to the nearest medical treatment facility as quickly as possible.

7.0 TRAINING

Associates and supervisors working in potential heat stress conditions are trained in the following subjects:

- How to identify potential heat stress situations,
- Signs and symptoms of heat stress disorders,
- First aid for heat illness and injuries,
- Maintaining fluid and salt intake,
- Acclimatization,
- Heat stress prevention program,

Initial training is performed at the time of hiring or placement in a potentially exposed work assignment. Subsequent training is provided as part of site-specific training in daily tailgate safety meetings. Training topics will also be reviewed during first aid/CPR classes.

Copies of training documentation are maintained in the worker's health and safety files.



**SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN**

ATTACHMENT L
COLD STRESS

SMITH ENVIRONMENTAL TECHNOLOGIES CORPORATION

SAFETY AND HEALTH PROGRAM

(SMTH35) COLD STRESS

1.0 PURPOSE

Cold-related illness is a hazard of working outdoors in cold environments. This procedure describes requirements for preventing occupational injury and illness due cold stress.

2.0 SCOPE

This procedure applies to all Smith Environmental Technologies Corporation (Smith Environmental) work operations involving ambient temperatures less than 40°F (4°C).

3.0 COLD STRESS CONSIDERATIONS

The body maintains its temperature by gaining heat from food metabolism and muscular work. The body's first defense against cold is constriction of blood vessels in the hands and feet, and shivering. If the body is unable to produce enough heat to maintain skin and core body temperature, the individual is at increased risk for cold stress disorders.

Environmental factors such as air velocity and moisture affect the amount of cold stress an individual experiences. Fatigue and personal factors such as weight, fitness and medical condition may influence a worker's risk of cold stress disorders.

4.0 COLD STRESS DISORDERS

4.1 Frostbite

Frostbite occurs when a body part receives inadequate heat from within the body. This allows freezing of the body tissues and fluids of that part. The most vulnerable parts of the body to frostbite are fingers, toes, cheeks, ears and nose. Frostbite can damage only the outer layers of skin or, in more severe conditions, deep into the body. Signs and symptoms of frostbite include pale skin (gray-yellow-white), pain and then numbness, stiffness and blisters.

At the first sign of altered feeling of the skin such as tingling, pain or numbness, workers should report to their supervisor and seek warming measures.

4.2 Hypothermia

Hypothermia can be life-threatening. It results from and the body's inability to maintain its core body temperature. Hypothermia can occur with prolonged work in cold environments, usually coupled with other predisposing factors such as smoking and overweight. The worker shivers uncontrollably and then stops shivering. The victim will have a subnormal body temperature, cool skin, slow breathing, weak pulse, listlessness, confusion and pain in the extremities. The worker may die unless rewarmed promptly.

5.0 PREVENTION AND TREATMENT

5.1 Preventive Measures

Preventive measures for cold stress will be implemented when the ambient air temperature is less than 40 degrees Fahrenheit. Measures may be implemented at higher temperatures when moisture and wind increase the impact of cold stress. Preventive measures will reduce the risk of serious injury and loss of work productivity.

Smith Environmental field associates will receive pre-employment and periodic medical examinations that include an evaluation of their ability to work under cold stress conditions.

Associates will use the buddy system, working in pairs or with at least one other person within their line of sight at all times.

5.2 Acclimatization

New associates or those unaccustomed to working under thermal stresses will be allowed to become acclimatized. During the first 7 days of work in a cold environment, their work load will be modified to begin at approximately 50 % of the expected work load, and is increased gradually each day. Associates can lose acclimatization in a few days. Those who have been away from the cold environment for more than four (4) days are allowed to re-acclimatize themselves as if they were new employees.

Employees are permitted to take rest breaks as often as necessary. However, all employees working under potential thermal stress conditions will take at least one 15-minute rest break every two hours, as a minimum. Work/rest cycles will be implemented for projects involving exposure to cold.

Warm protected break areas will be provided. Under extreme heat stress conditions, consideration will be given to working in the warmer times of the day (during sunshine). Vehicles and heavy-equipment cabs will be heated.

Workers will be instructed to wear adequate layered clothing for warmth, but not excessive to cause sweating. The use of heating devices such as radiant jets, hot plates and blowers may be implemented on a site-specific basis.

Workers will self-monitor for signs and symptoms of cold stress. Additional monitoring by health professionals for body temperature, peripheral pulse, respiratory rate and/or blood pressure will be considered under special circumstances.

Employees experiencing symptoms of cold stress will not be permitted return to work in potential cold stress conditions until they have been evaluated by a physician and released to return to work.

5.3 First Aid

Medical personnel and emergency transportation will be summoned immediately for any associate experiencing symptoms of hypothermia. The victim should sit or lie down. On-site first aid personnel will be summoned to evaluate victims of cold stress. If fully conscious, the associate will be encouraged to drink warm liquids and may be wrapped with warm blankets to promote warming. Associates may also be placed in a heated vehicle or trailer to facilitate warming.

Associates experiencing symptoms of cold stress such as pain in the extremities, lethargy, slurred speech, or intense shivering will immediately decontaminate, remove PPE, and move to a warm break area. Street clothing should be removed if it is wet. The victim will be wrapped in warm blankets.

Associates experiencing symptoms of cold stress will not be permitted return to work under potential cold stress conditions until they have been evaluated by a physician and released to return to work.

Hypothermia is an immediate life-threatening condition. The victim will be transported to the nearest medical treatment facility as quickly as possible. Smith Environmental or personal vehicles may be used to transport victims from work sites where ambulance transport is not available or cannot respond within 5 minutes of a telephone call to emergency medical personnel.

6.0 TRAINING

Initial training is performed for new hires in a potentially exposed work assignment and during 40-hour hazardous waste operations safety training. These will include:

- How to identify potential cold stress situations.
- Signs and symptoms of cold stress disorders,
- First aid for cold illness and injuries,
- Cold stress prevention program,

Training topics will be reviewed during first aid/CPR classes and site-specific safety meetings. Copies of training documentation are maintained in the associate's safety and health training files.



ATTACHMENT O
LINE BREAKING

**SMITH ENVIRONMENTAL TECHNOLOGIES CORPORATION
SAFETY AND HEALTH PROGRAM
(SMTH61) LINE BREAKING**

1.0 PURPOSE

This program describes minimum safe work practices for breaking lines or piping that has previously been pressurized or filled with hazardous chemicals.

2.0 SCOPE

This program applies to operations performed by Smith Environmental Technologies Corporation (Smith Environmental) associates involving the separation of process lines, pipelines, water and natural gas lines, transfer lines and any other permanent, fixed, flexible or temporary piping. It does not apply to hoses used in the temporary connection of a tank truck, vacuum truck or pressure washer. Subcontractors must have their own line breaking programs that comply with OSHA standards and are at least as protective as this program.

This program will be used with Safety and Health Program SMTH55 for lockout and tagout requirements.

3.0 RESPONSIBILITIES

3.1 Site Supervisors

Site supervisors will verify that only properly trained workers perform line breaking activities and that Line Breaking Permits are properly completed before work begins. These individuals are authorized to approve Line Breaking permits. Site supervisors include superintendents, foremen, lead men, engineers, project coordinators and other personnel responsible for managing daily work assignments at a project site.

3.2 Site Safety and Health Officers

Site safety and health officers (SHOs) are authorized to review and approve Line Breaking Permits. Site safety staff will inspect line breaking activities to verify that they are performed safely and in compliance with this program. Site safety staff are responsible for verifying that workers are trained in safe work practices for Line Breaking. These individuals will also verify that contractors have equivalent training before performing line breaking at Smith Environmental job sites.

3.3 All Associates

Smith Environmental associates will complete required training before participating in line breaking work. Associates are responsible for performing line breaking activities safely and in compliance with this program. Associates will immediately notify their supervisor or the SHO of any unsafe conditions or equipment failures during line breaking.

4.0 EQUIPMENT REQUIREMENTS

- Lockout devices and tags
- Buckets, pails
- Spill absorbent
- Spill containers
- Shovels
- Fire extinguishers
- First aid kits
- Emergency shower and eyewash
- Non-sparking tools

5.0 TRAINING

Associates must be trained in safe work practices for line breaking before participating in these activities. Training may be presented by the SHO or site supervisor at the job site.

Training is site-specific and should consist of both lecture and hands-on demonstration exercises. Records of Line Breaking training will be copied to Smith Environmental's associate training files. Originals may be kept in the project files.

6.0 OPERATIONAL PROCEDURES

6.1 Pre-Mobilization

6.1.1 Identify Line Contents and Potential Hazards

The contents of each line must be identified prior to line breaking. Material Safety Data Sheets or equivalent information on each material must be obtained from the property owner, facility operator, or Smith Environmental safety and health staff.

When breaking lines of abandoned facilities where this information is not available, lines will be approached as unknown, potentially flammable and/or toxic conditions.

6.1.2 Lockout and Tag Equipment and Processes

Associated equipment and processes must be locked out and tagged prior to line breaking. This will require contacting the property owner or facility manager to arrange for equipment and process lockouts during line breaking activities. The property owner or facility manager and the client must be notified in advance of any utility or process material shut downs, to protect critical machinery and processes and prevent spills and injuries.

6.1.3 Drain, Purge, and Depressurize Lines

The property owner or facility manager must be contacted to determine whether the lines to be opened have been drained and purged. Details must be obtained on when and how the draining and purging were performed. This information will assist in verifying whether residual pressure or chemicals may still be trapped in the lines. It is preferable to have lines drained and purged by facility personnel.

If Smith Environmental personnel will perform draining and purging, a facility representative familiar with the specific lines should be present during these operations to verify that lines are correctly identified before draining.

When breaking lines of abandoned facilities where this information is not available, lines will be approached as unknown, potentially flammable and/or toxic conditions.

6.1.4 Determine Methods for Capturing Gas and Vapor Releases

Associates are prohibited from releasing toxic and reactive gases into the work environment. It will be necessary to determine where and how gases and vapors will be released during line breaking. Special local exhaust ventilation systems may be required. Releases to the outside air must not violate local, state, or federal air pollution control regulations. The local environmental and air pollution authorities must be contacted to determine which standards apply to the specific project.

6.2 Line Breaking Steps

A Line Breaking permit will be completed prior to physically cutting or separating any line. The Permit must be approved by the project supervisor or site safety staff.

All lines must be drained back into their respective storage reservoirs or tanks, if possible.

All connections and valves, power and electrical supplies for the lines to be broken must be shut off, de-energized, and locked out to prevent refilling, re-pressurizing, or energizing the lines while open.

Personnel must double check for cross-connections and backup devices that could refill the lines. If available, line pressure valves, must be checked prior to breaking, to determine whether each line is under any residual pressure.

Lines that have contained potentially flammable or reactive materials should be filled with an inert gas before cutting, to prevent fires and explosions. Only non-sparking tools and cold-cutting methods will be used to cut these lines.

Appropriate personal protective equipment (PPE) and respirators, as defined in the site-specific safety and health plan, will be worn during line breaking activities.

All unnecessary personnel will leave the immediate work area before line breaking begins. Workers performing line breaking will take a position standing to the side of the valve or cut, to avoid being sprayed by material from the line.

6.2.1 Liquids

Excess liquid must be drained from appropriate valves on all liquid lines prior to cutting or physical separation. Low points in the lines where liquids may have accumulated must also be located and drained.

A bucket or other appropriate container must be placed under the drain valve in each line, to collect liquid leaks. The bucket or container must be chemically compatible with the liquid to be drained.

Prior to cutting or physical separation, lines will be flushed with water or another purging solution that is chemically compatible with the line contents. Inert gas, such as nitrogen, can also be used, but gases are not as effective for purging liquid lines.

Lines will be drained and flushed a minimum of three times, collecting all flushing solutions in appropriate containers for disposal.

Following draining and purging, workers will verify that no pressure remains in the lines to be broken.

6.2.2 Gases

Residual gas pressure must be vented to an appropriate receiver or exhaust system prior to cutting or physically separating gas lines. Following venting, pressure valves will be rechecked to assure that lines have reached ambient air pressure. Gas lines will be flushed at least three times with an inert gas such as nitrogen, to remove residual gas from low points in the lines. Workers will verify that lines have reached ambient air pressure prior to cutting or physical separation.



**SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN**

**ATTACHMENT P
HOTWORK**

SMITH ENVIRONMENTAL TECHNOLOGIES CORPORATION

SAFETY AND HEALTH PROGRAM

(SMTH54) HOT WORK

1.0 PURPOSE

This program provides minimum requirements for safe work practices during hot work activities such as burning, welding and cutting. This program is intended to assure compliance with the requirements of OSHA standards for these activities (29 CFR 1910, Subpart Q). Instructions are included for completing "Hot Work" permits before such activities begin.

2.0 SCOPE

This program applies to Smith Environmental Technologies Corporation (Smith Environmental) operations that can produce ignition sources such as sparks, hot surfaces, or open flames. Subcontractors must have their own standard operating procedures for hot work activities that comply with OSHA regulations and are at least as protective as this program.

Additional safety information for specific work operations will be covered in site safety and health plans. For further assistance contact the regional or district safety and health staff.

3.0 DEFINITIONS

Hot Work: Burning, welding, cutting, brazing or other activities capable of producing ignition sources.

Hazardous Area: Locations where flammable or combustible materials are handled or stored.

4.0 RESPONSIBILITIES

4.1 Site Supervisors and Site Safety Staff

The site supervisor and site safety staff are responsible for assuring that safe work practices are used in performing hot work activities. They will provide initial and annual refresher training on this program and verify written documentation of that training.

4.2 All Associates

Associates are responsible for complying with this program and for notifying their supervisors of any questions or unsafe situations involving hot work activities.

Welders are responsible for providing proof of training in the specific type of welding to be performed, before beginning hot work operations. Associates are prohibited from performing hot work or operating welding equipment without documented training and work experience in these activities.

5.0 EQUIPMENT REQUIREMENTS

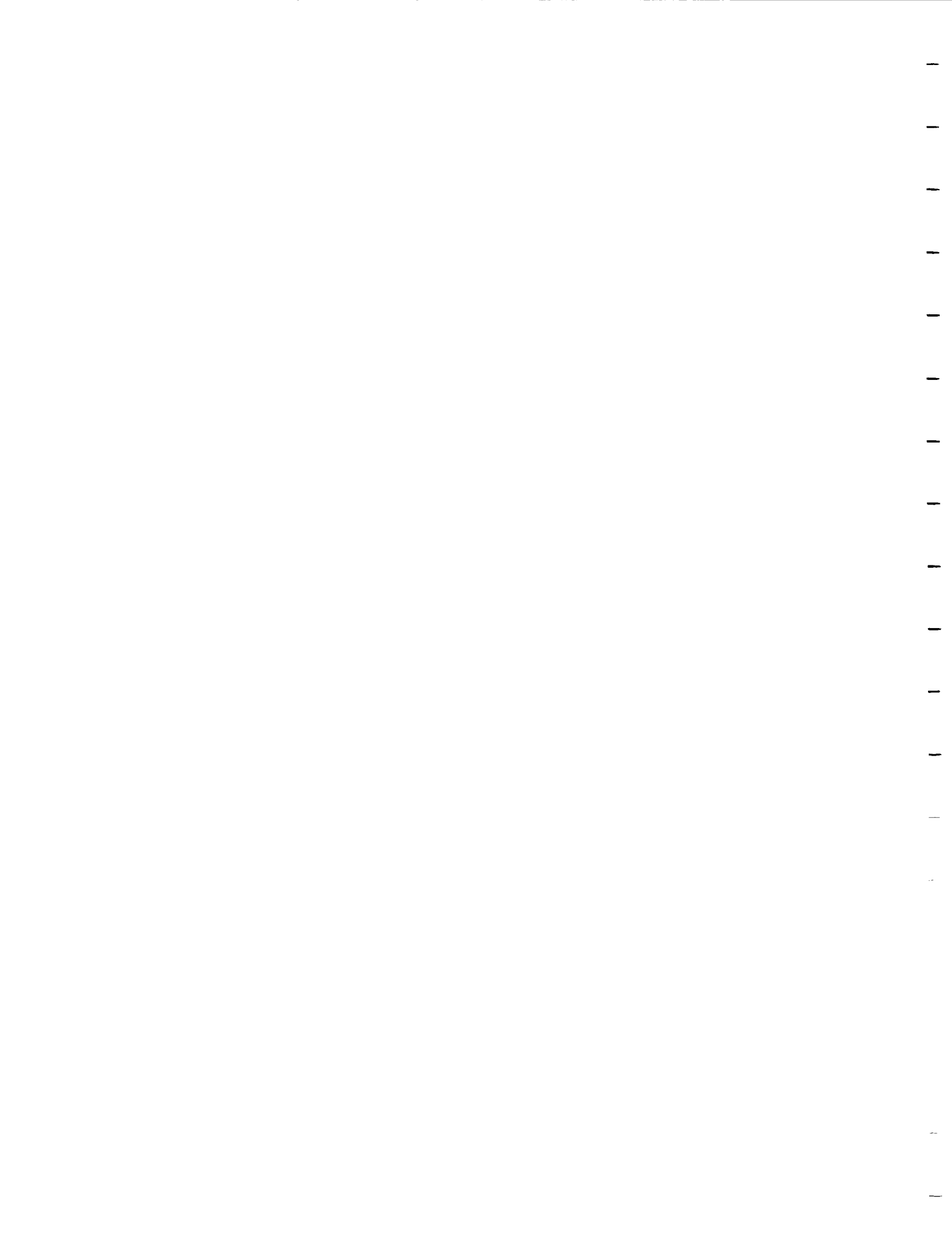
Welding, burning, cutting and brazing equipment must be chosen for safe application to the intended work. This includes selection of equipment properly constructed for unusual environmental conditions such as high temperatures or weather conditions that may occur during hot work operations. This equipment may include:

- Compressed gases, welding rods and filler metals, electrodes and other equipment appropriate to the specific hot work activity.
- Minimum 20 pound ABC-type fire extinguishers.
- First aid kit.
- Welding screens for welding operations.
- Empty, Full and Partially Full tags for compressed gas cylinders.
- Welder's helmet or face shield with an eyeshade meeting the requirements of Table 1 for the specific activity.
- Leather or heavy duty cloth gloves, and cloth coveralls or long-sleeved shirt and pants, to prevent skin exposure to ultraviolet radiation and metal fume.
- Steel-toed safety shoes or boots with minimum 6-inch high tops. Metatarsal guards are required if objects such as large pieces of machinery must be moved.
- Hearing protection (ear plugs or muffs).
- Respiratory protection as defined by the site-specific safety and health plan.

6.0 HOT WORK PERMITS

Hot Work Permits must be completed and signed before beginning any hot work in a hazardous area, as defined in Section 3 above. The only exception to this requirement is for hot work performed in isolated areas, specifically set up for this purpose, where no hazardous conditions are present. Such areas would include maintenance shops with designated burning and welding areas.

Hot Work permits may be obtained from the safety and health staff. Hot Work permits are good for one work shift only. If hot work is interrupted for more than one hour, a new permit is required before work resumes.



4.2 All Associates

Associates are responsible for complying with this program and for notifying their supervisors of any questions or unsafe situations involving hot work activities.

Welders are responsible for providing proof of training in the specific type of welding to be performed, before beginning hot work operations. Associates are prohibited from performing hot work or operating welding equipment without documented training and work experience in these activities.

5.0 EQUIPMENT REQUIREMENTS

Welding, burning, cutting and brazing equipment must be chosen for safe application to the intended work. This includes selection of equipment properly constructed for unusual environmental conditions such as high temperatures or weather conditions that may occur during hot work operations. This equipment may include:

- Compressed gases, welding rods and filler metal, electrodes and other equipment appropriate to the specific hot work activity.
- Minimum 20 pound ABC-type fire extinguishers.
- First aid kit,
- Welding screens for welding operations.
- Empty, Full and Partially Full tags for compressed gas cylinders,
- Welder's helmet or face shield with an eyeshade meeting the requirements of Table 1 for the specific activity,
- Leather or heavy duty cloth gloves, and cloth coveralls or long-sleeved shirt and pants, to prevent skin exposure to ultraviolet radiation and metal fume.
- Steel-toed safety shoes or boots with minimum 6-inch high tops. Metatarsal guards are required if objects such as large pieces of machinery must be moved,
- Hearing protection (ear plugs or muffs),
- Respiratory protection as defined by the site-specific safety and health plan.

6.0 HOT WORK PERMITS

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Hot Work permits may be obtained from the safety and health staff. Hot Work permits are good for one work shift only. If hot work is interrupted for more than one hour, a new permit is required before work resumes.

Site safety and health staff and site supervisors are authorized to sign Hot Work permits.

7.0 OPERATIONAL PROCEDURES

7.1 Fire Prevention

The immediate work area must be cleared of all flammable and combustible materials before hot work begins. This includes removing weeds, trash and debris. Materials that cannot be removed must be protected with fire resistant covers.

At least one ABC-type fire extinguisher must be present in the immediate area before hot work begins. Where there is any potential for accumulating flammable or combustible atmospheres, a combination oxygen/combustible gas indicator (CGI) will be used to perform continuous monitoring during hot work activities.

Hot work activities require posting a fire watch to look for smoldering fires that may be caused by the operation. The fire watch must remain in the immediate area of the hot work for at least 30 minutes after the activity stops, to ensure that no smoldering fires are present.

Where floor openings or cracks exist near hot work activities, these openings must be closed to prevent sparks and hot metal from falling to lower levels and igniting fires. Where closure is impractical, all flammable and combustible materials below the hot work area must be protected with fire resistant covers and a specific fire watch person must be posted to look for potential fires on the lower level. The fire watch must remain in effect for at least 30 minutes after hot work ends.

Welding screens or other fire resistant barriers must be placed around all welding and cutting operations to prevent exposure of nearby personnel to sparks, hot metal and ultraviolet radiation.

7.2 Prohibited Activities

Hot work is also prohibited in the presence of flammable or explosive atmospheres, and in areas where large quantities of readily ignitable materials are stored. These materials include sulfur, paper or cardboard, and cotton.

Hot work is prohibited on containers and tanks of any kind until and unless they have been appropriately locked out, isolated, tagged and thoroughly cleaned of flammable and combustible materials.

Use of electrical equipment is prohibited when associates must stand or work in puddles or other wet areas.

7.3 Compressed Gas Cylinders

Smoking is prohibited within 75 feet of compressed gas cylinders. Smoking is allowed in designated break areas only.

Compressed gas cylinders will be labelled with their contents and tagged to show whether they are full, partially full or empty.

Compressed gases must be shut off as soon as welding, burning and cutting operations are completed. Compressed gases must be transported on cylinder carts, whenever possible. Cylinders must be chained to the cart during movement. Where local ground is too rough to permit the use of cylinder carts, associates will carefully roll one cylinder at a time into place.

Compressed gas cylinders must be kept upright and tied to a stationary object when they are stored or in use. Vehicles and heavy equipment ARE NOT acceptable as tie-off locations for gas cylinders.

Oxygen regulators must be oil and grease-free and restricted to use with oxygen gas only. All cylinder regulators must be removed and cylinder safety caps must be screwed on as soon as compressed gas use is finished. Associates are prohibited from storing or transporting gas cylinders with the regulators on.

Oxygen and fuel gas cylinders must be stored at least 20 feet apart unless they are separated by a noncombustible barrier at least five feet high with a minimum fire-resistance rating of 30 minutes.

No more than 2000 ft³ of fuel gases may be stored in one building. Storage of compressed gas cylinders must be in a location protected from weather, vehicle traffic and ignition sources.

7.4 Equipment Selection and Maintenance

All hoses, electrical cords and electrodes must be neatly stored when not in use.

All welding and cutting equipment must be properly bonded and grounded.

Material Safety Data Sheets for each type of welding rod, filler metal and fusible granular material used must be present in the work area during hot work. Containers and packages of welding rod, filler metals and fusible granular materials must be labelled with their metallic composition and appropriate hazard warnings in compliance with OSHA hazard communication standards.

All equipment used for hot work must be visually inspected for damage and defects before each use. Damaged or defective equipment must be tagged out of service immediately and not be used until the faulty parts have been repaired or replaced.

8.0 Personnel Protective Equipment and Respirators

Forced air or local exhaust ventilation will be used whenever possible to control toxic or flammable atmospheres generated by welding, cutting, brazing or other hot work activities. In situations where these measures are not practical, respiratory protection with the appropriate protective lens shade will be used to prevent exposure to welding fume and toxic gases and vapors until air monitoring demonstrates exposures are below allowable occupational limits.

Safety glasses or goggles with side shields are required for associates performing hot work and for other personnel near the hot work area. Welder's eyeshades will be worn by associates performing hot work to protect against ultraviolet radiation and flying metal. Other personnel near the hot work area must also wear welder's eyeshades unless they are protected by welding screens. Eyeshades will be selected in accordance with Table 1, attached.

Associates are prohibited from wearing loose clothing and jewelry, or oil-soaked clothing during hot work activities. Protective clothing consisting of at least leather or cotton work gloves and a long-sleeved cotton shirt and pants, will be worn during hot work activities. Leather aprons and jackets may be added to these items. Cotton caps or flame resistant hats must be worn to protect the head, ears and face from UV radiation, sparks and flying metal. Leather jackets, aprons, gloves and pants will be worn for protection as necessary.

Synthetic clothing is prohibited due to its tendency to melt or cause flash fires when hit by flying sparks and hot metal. Chemical-resistant clothing such as Tyvek, PolyTyvek and Saranex will be removed prior to hot work activities. These materials pose the same fire hazards as other synthetic clothing materials.

9.0 CONFINED SPACE ENTRIES

Hot work activities in confined spaces will require local exhaust ventilation to remove toxic metal fume, gases and vapors. Compressed gas cylinders and welding machines must remain outside the confined space. Hoses and electrodes must be long enough to reach the work area inside the confined space without kinking, tangling or stretching.

Confined spaces must be cleaned and flammable gases, vapors and liquids must be completely removed before hot work begins. Continuous air monitoring with direct-reading instruments will be performed during hot work in confined spaces. This must include oxygen, flammable atmospheres and toxic gases and vapors, as a minimum.

Torch valves and cylinder valves must be closed and the torches removed from the confined space during lunch breaks and whenever hot work operations stop for one hour or longer. During lunch breaks and whenever hot work operations stop for one hour or longer, welding machines must be disconnected from the power source, electrodes removed from their holders and the holders positioned to prevent accidental contact.

TABLE 1
EYESHADE REQUIREMENTS FOR WELDER'S HELMETS AND GOGGLES
(29 CFR 1910.133)

Welding/Cutting Operations	Electrode Size (inches)	Arc Current	Minimum Protective Shade*
Shielded metal arc welding	< 3/32	< 60	7
	3/32 - 5/32	60 - 160	8
	5/32 - 8/32	160 - 250	10
	> 8/32	250 - 550	11
Gas metal arc and Flux cored arc welding		< 60	7
		60 - 160	10
		160 - 250	10
		250 - 500	10
Gas tungsten arc welding		< 50	8
		50 - 150	8
		150 - 500	10
Air carbon arc cutting	Light	< 500	10
	Heavy	500 - 1000	11
Plasma arc welding		< 20	6
		20 - 100	8
		100 - 400	10
		400 - 800	11
Plasma arc cutting	Light**	< 300	8
	Medium**	300 - 400	9
	Heavy**	400 - 800	10
Torch brazing and torch soldering and carbon arc welding			3
			2
			14

TABLE 1
EYESHADE REQUIREMENTS FOR WELDER'S HELMETS AND GOGGLES
(29 CFR 1910.133)

Welding/Cutting Operations	Plate Thickness (inches)	Plate Thickness (mm)	Minimum Protective Shade*
Gas Welding			
Light	< 1/8	< 3.2	4
Medium	1/8 - 1/2	3.2 - 12.7	5
Heavy	> 1/2	> 12.7	6
Oxygen Cutting			
Light	< 1	< 25	3
Medium	1 - 6	25 - 150	4
Heavy	> 6	> 150	5

* As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade that gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light spectrum.

** These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the workpiece.

SITE: _____

PROJECT#: _____

ISSUED TO: _____

LOCATION: _____

DATE: _____

HOT WORK ACTIVITY (check appropriate box):

YES	NO	
<input type="checkbox"/>	<input type="checkbox"/>	Welding (electric or gas)
<input type="checkbox"/>	<input type="checkbox"/>	Oxy-acetylene torch
<input type="checkbox"/>	<input type="checkbox"/>	Abrasive Grinding
<input type="checkbox"/>	<input type="checkbox"/>	Heat Treatment
<input type="checkbox"/>	<input type="checkbox"/>	Cutting
<input type="checkbox"/>	<input type="checkbox"/>	Other _____

SAFETY CHECKLIST (check appropriate box):

<input type="checkbox"/>	<input type="checkbox"/>	Material to be worked on has been evaluated for hazardous emissions
<input type="checkbox"/>	<input type="checkbox"/>	Work area free of flammable or combustible materials
<input type="checkbox"/>	<input type="checkbox"/>	Fire extinguishers on hand and full
<input type="checkbox"/>	<input type="checkbox"/>	Fire watch posted (if required) Name: _____
<input type="checkbox"/>	<input type="checkbox"/>	Emergency exit routes clear
<input type="checkbox"/>	<input type="checkbox"/>	Ventilation provided (if confined area or poor natural ventilation)
<input type="checkbox"/>	<input type="checkbox"/>	Worker has appropriate eye protection, face shield, clothing and respirator (if required)
<input type="checkbox"/>	<input type="checkbox"/>	Compressed gas cylinders are secured
<input type="checkbox"/>	<input type="checkbox"/>	Equipment has been inspected and is free of defects
<input type="checkbox"/>	<input type="checkbox"/>	Others in immediate area have been notified of hot work activity
<input type="checkbox"/>	<input type="checkbox"/>	Welding or cutting work performed behind shielding (where practical)
<input type="checkbox"/>	<input type="checkbox"/>	Fall protection provided (where applicable)
<input type="checkbox"/>	<input type="checkbox"/>	Potential hazardous atmospheres checked: _____ % LEL _____ % Oxygen

When applicable, this permit may be used in conjunction with a Confined Space Entry Permit

Valid from: _____ To: _____

I have verified that all requirements of the hot work procedure and permit have been met and therefore issue this permit.

ISSUED BY: _____

TITLE: _____



**SMITH TECHNOLOGY CORPORATION
SITE SAFETY PLAN**

ATTACHMENT Z

**SITE SAFETY PLAN
ACKNOWLEDGMENT FORM**



I have been informed and understand and will abide by the procedures set forth in the Safety and Health Plan and Amendments for the Mid-America Refinery Site.

[illegible]

APPENDIX B

GOLDER HEALTH AND SAFETY PLAN



1. ITEMS 1-9 TO BE COMPLETED BY PROJECT MANAGER.

Project Name KDHE/MARCO COMPREHENSIVE INVESTIGATION/KANSASTask Comprehensive Investigation of the Mid-American Refining Company SiteRequested by Kansas Department of Health and EnvironmentProposed Start-Up Date April 1 1998 Project/Task No. 973-2300.3

Rev. Level _____

Prepared by/Reviewed by Health and Safety Officer

Printed Name Maureen YaskaninSignature Maureen A. Yaskanin Date 3 - 31, 1998

Reviewed by Project Health and Safety Coordinator

Printed Name Mike KellerSignature Michael Keller Date 3 - 31, 1998

Approved by Project Manager

Printed Name Randy MarchSignature R. March Date March 31, 1998Title Engineering Program Manager/Associate

Note to Project Managers:

A signed and completed copy of the Health and Safety Plan and a signed and completed copy of the safety briefing (p. 14) must be included in the project file.

2. PROJECT DESCRIPTION:

Phase II investigation to determine the horizontal and vertical extent of contamination that has migrated off-site of the Mid-American Refining Company (MARCO) property. Soil and groundwater sampling downgradient of the MARCO site will be performed to define the nature and extent of BTEX and related petroleum compound contamination. Intrusive activities will be performed using a drill rig and hollow stem augers. Two-inch diameter monitoring wells will be installed at selected boreholes for groundwater sampling and water level collection.

3. LOCATION:

The site is located in Neosho County immediately north of the city limits of Chanute, in southeastern Kansas.

4. FACILITY/WORK SITE DESCRIPTION:

The MARCO site study area is bounded: to the east by U.S. Highway 169 (Santa Fe Avenue) and several businesses; to the north by Ash Grove Road and Ash Grove Cement Company; to the west by EOTT Energy Corp.; and to the south by Hickory Street and several businesses and residences.

5. PROPOSED PERSONNEL AND TASKS:

Project Manager Randy March

Field Team Leader Mike Keller

5. PROPOSED PERSONNEL AND TASKS (CON'T):Proposed Field TeamJob Function/Tasks

Randy March-Golder

Project Manager

Michael Keller-Golder

Direction and oversight of drilling/sampling activities

GeoCore Drill Crew

Operation, maintenance and decontamination of drill rig

6. CONFINED SPACE ENTRY

A confined space is defined as any space not currently used or intended for human occupancy, having a limited means of egress, which is subject to the accumulation of toxic contaminants, a flammable or oxygen deficient atmosphere, or other hazards, such as engulfment, or electrical or mechanical hazards should equipment be inadvertently activated while an employee is in the space. Confined spaces include but are not limited to storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, air pollution control devices, smoke stacks, underground utility vaults, sewers, septic tanks, and open top spaces more than four feet in depth such as test pits, waste disposal trenches, sumps and vats.

Will this task require entry into any confined
or partially confined space?

☐ YES Describe below
☒ No

7. CUTTING AND WELDING

Will this task involve use of a cutting torch
or welding?

☐ YES Describe below
☒ No

8. OTHER POTENTIAL HAZARDS

- | | |
|--|--|
| <input checked="" type="checkbox"/> Chemical | <input checked="" type="checkbox"/> Trips, Slips, Falls |
| <input type="checkbox"/> Radiological | <input type="checkbox"/> Trenching/Shoring |
| <input checked="" type="checkbox"/> Fire/Explosion | <input type="checkbox"/> Heavy Equipment/Vehicular Traffic |
| <input checked="" type="checkbox"/> Cold Exposure | <input type="checkbox"/> Overhead Hazards |
| <input type="checkbox"/> Electrical | <input type="checkbox"/> Unstable/Uneven Terrain |
| <input checked="" type="checkbox"/> Machinery/Mechanical Equipment | <input checked="" type="checkbox"/> Other - Describe below |

6,7,8 DESCRIPTION/OTHER

Because of the intrusive activities associated with this project underground utilities should be located and clearly marked before drilling.

9. I, Randy March, attest that this information is accurate to the best of my knowledge and hereby request a Health and Safety Plan for the task(s) designated above.

Signature _____ Date _____

Title: Engineering Program Manager/Associate

10. CHEMICAL/RADIOLOGICAL HAZARD EVALUATION

<u>Waste Media</u>	<u>Hazardous Characteristics</u>
<input type="checkbox"/> Airborne Contamination	<input checked="" type="checkbox"/> Ignitable
<input type="checkbox"/> Surface Contamination	<input type="checkbox"/> Corrosive
<input checked="" type="checkbox"/> Contaminated Soil	<input type="checkbox"/> Reactive
<input checked="" type="checkbox"/> Contaminated Groundwater	<input checked="" type="checkbox"/> Explosive
<input checked="" type="checkbox"/> Contaminated Surface Water	<input checked="" type="checkbox"/> Toxic (non-radiological)
<input type="checkbox"/> Solid Waste	<input type="checkbox"/> Radioactive
<input type="checkbox"/> Liquid Waste	<input type="checkbox"/> Sludge

10. CHEMICAL/RADIOLOGICAL HAZARD EVALUATION (CON'T)**Substance**

This task will involve the reasonable possibility of exposure to the substances listed below at concentrations or in quantities which may be hazardous to the health of the site personnel.

Primary Hazard (Rate: low, med, high, ext)

Substance	Inhalation of Gases/ Vapors	Inhalation of Dusts/ Mists	Ingestion	Dermal absorption of Solids/ Liquids or Skin Contamination	Dermal absorption of gases/ vapors	Corrosiv e/Irritant	Ignitability	Reactivity /Explosion
Benzene	high	low	ext	high	low	high	high	high
Toluene	high	low	ext	high	low	high	high	high
Ethyl Benzene	high	low	ext	high	low	high	high	high
Xylene	high	low	ext	high	low	high	high	high

The primary exposure mechanism for this project will be dermal contact with groundwater. Contaminated groundwater at or near the site has historically contained benzene at concentrations near the exposure limit.

Substance	Exposure Limit	IDLH Level	Health Effects
Benzene	1 ppm	3000 ppm	Carcinogenic; Irritant; Int. Organ Damage
Toluene	100 ppm	2000 ppm	Eye/Skin Irritant; Int. Organ Damage
Ethyl Benzene	100 ppm	2000 ppm	Irritant; Respiratory; Nervous System
Xylene	100 ppm	1000 ppm	Eye/Skin Irritant; Int. Organ Damage

11. PERSONAL PROTECTIVE EQUIPMENT

Level D

- ☒ Standard works clothes
- ☒ Hard hat, steel toed boots, safety glasses during drill rig operation
- ☒ Ear protection during drill rig operation
- ☒ Latex gloves
- ☐ Outer NBR gloves

NO CHANGES TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE KNOWLEDGE AND APPROVAL OF THE HEALTH AND SAFETY OFFICER AND THE PROJECT MANAGER

12. DECONTAMINATION

Personnel and equipment leaving the drill site shall proceed through the following decontamination procedures:

Personnel Decontamination

Personnel shall remove and dispose of latex gloves and any clothing that has been contaminated between sample points. Any type of contact with the contaminants of concern must be addressed immediately. Proper personal hygiene practices (i.e. washing of hands prior to eating) should be followed throughout sampling activities.

Equipment Decontamination

Drilling equipment : Drill rods, cutting shoes, core barrels, and all other equipment and tools that possibly contact contaminated soil or water during intrusive activities will be thoroughly decontaminated between sample points. Decontamination will be performed using a high pressure/temperature portable spray unit or equivalent.

Sampling equipment: Groundwater sampling equipment decontamination will include: wash with a nonphosphate laboratory grade detergent and potable water; rinse with potable water; and, triple rinse with distilled water. Sample tubing and other disposable equipment will be discarded after use.

13. ON-SITE ORGANIZATION AND COORDINATION

Project Manager: Randy March

Field Team Leader: Michael Keller

Site Safety Officer: Michael Keller

Field Team:	Name	Job Function
	<u>Randy March</u>	<u>Project Manager</u>
	<u>Michael Keller</u>	<u>Oversight and direction of drilling/sampling activities</u>
	<u>Hydro-Logic Drill Crew</u>	<u>Operation and maintenance of drill rig</u>

14. SPECIAL INSTRUCTIONS

15. SANITATION REQUIREMENTS

Potable water supply available on work site?

☒ Yes

☐ No

Portable toilets required on work site?

☐ Yes If Yes, how many? _____

☒ No

Temporary washing/shower facilities required at work site?

☐ Yes If yes, describe below.

☒ No If no, state location of
existing facilities.

Description:

16. FIELD PROCEDURES CHANGE AUTHORIZATIONInstruction Number
to be changedDuration of Authorization Requested
____ Today only
____ Duration of Task

Date: _____

Description of Procedures Modification:

Justification:

Person Requesting Change:

Verbal Authorization Received From:

Name_____
Name_____
Time_____
Title_____
Title_____
Time_____
Signature_____
Approved By
(Signature of person named above to
be obtained within 48 hours of verbal
authorization)

17. EMERGENCY PROCEDURES This page is to be posted at prominent location on site.

Yes No

☐ ☒ On-site Communications Required? Emergency Channel _____Nearest Telephone Total Service Station near the southeast corner of the MARCO site**Fire and Explosion**

In the event of a fire or explosion, if the situation can be readily controlled with available resources without jeopardizing the health and safety of yourself, the public, or other site personnel, take immediate action to do so, otherwise:

1. Notify emergency personnel by calling 911.
2. If possible, isolate the fire to prevent spreading.
3. Evacuate the area

Chemical Exposure

Site workers must notify the site health and safety officer immediately in the event of any injury or any of the signs or symptoms of overexposure to hazardous substances identified below:

Substances PresentSymptoms of Acute ExposureFirst Aid

BTEX Compounds

Giddiness; Headache; Nausea;
Staggering Gait; Eye/Skin Irritation;Irrigate Eye and Wash Skin
Promptly; Seek Immediate
Medical Attention for
Inhalation or Ingestion.

On Site Injury Or Illness

In the event of an injury requiring more than minor first aid, or any employee reporting any sign or symptom of exposure to hazardous substances, immediately take the victim to the Neosho Memorial Hospital located at 7th Street and Plummer Avenue in Chanute, phone 431-4000 or 911. In the event of life-threatening or traumatic injury, implement appropriate first-aid and immediately call for emergency medical assistance at 911. The nearest designated trauma center is located at Neosho Memorial Hospital, phone 431-4000 or 911.

Designated Personnel Current in First Aid/CPR (Names)

_____	_____
_____	_____
_____	_____
_____	_____

Designated Back-up Personnel (Names)**Function**

_____	_____
_____	_____
_____	_____
_____	_____

Required Emergency Back-up Equipment**Emergency Response Authority**

Mike Keller is the designated site emergency coordinator and has final authority for first response to on-site emergency situations.

Upon arrival of the appropriate emergency response personnel, the site emergency coordinator shall defer all authority but shall remain on the scene if necessary to provide any and all possible assistance.

At the earliest opportunity, the site safety officer or the site emergency coordinator shall contact the project coordinator or health and safety officer.

Project Coordinator Randy March Phone (w) (303) 980-0540 (h) (303) 973-1632

Health and Safety Maureen Yaskanin Phone (w) (303) 980-0540 (h) (303) 988-1304
Officer

18. SAFETY BRIEFING

The following personnel were present at pre-job safety briefing conducted at _____
(time) on _____ (date) at _____ (location), and have read the above plan and are
familiar with its provisions:

Name	Signature
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Fully charged ABC Class fire extinguisher available on site?	YES <u>X</u>
Fully stocked First Aid Kit available on site?	YES <u>X</u>
All project personnel advised of location of nearest phone?	YES <u>X</u>
All project personnel advised of location of designated medical facility or facilities?	YES <u>X</u>

Mike Keller

Printed Name of Field Team Leader or Site Safety Officer

Signature_____
Date

